I IRON

DRAGON USER

The independent Dragon magazine

95p US$3.25 February 1986



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We make no secret of our support for FLEX (0★9 fanatics may skip this paragraph). It's one of the most friendly and easy to use operating systems and has been popular with 6800 and 6809 users for many years. Our implementation on the DRAGON has autorepeat, 51 by 24 Hi-Res text screen with windows, true lowercase, redefinable character sets and still leaves a full 48K of memory free for programs and data and happily uses 40 or 80 track disks, single/double sided, single/double density
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A must for every DRAGON owner. Gets you out of the rut of the 32 by 16 screen and the limited EDIT command. Allows BASIC to work with a 51 by 24 Hi-Res Screen and edit your programs with a full screen editor and comprehensive programmer's toolkit.

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The ideal combination for learning and using machine code on the DRAGON. DASM is a specially designed assembler for the DRAGON which is easy and convenient to use from BASIC, allowing in-line assembly. DEMON is an interactive machine code monitor which lets you look at the internal workings of the DRAGON as well as helping you to debug your machine code programs.

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OS-9 BUSINESS SOFTWARE for the DRAGON

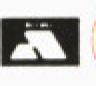
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How to submit articles

The quality of the material we can publish in *Dragon User* each month will, to a very great extent depend on the quality of the discoveries that you can make with your Dragon. The Dragon computer was launched on to the market with a powerful version of Basic, but with very poor documentation.

Articles which are submitted to *Dragon User* for publication should not be more than 3000 words long. All submissions should be typed. Please leave wide margins and a double space between each line. Programs should, whenever possible, be computer printed on plain white paper and be accompanied by a tape of the program.

We cannot guarantee to return every submitted article or program, so please keep a copy. If you want to have your program returned you must include a stamped, addressed envelope.

Contents



Editorial

In days of old, so ancient myths tell, Dragons were solitary beasties, hiding away, keeping themselves to themselves, guarding their horde of treasure. And I guess the same used to be with Dragon owners.

When you could nip into W. H. Smith to buy your favourite game, or pop into your local computer shop to check out some new peripheral. When you could ring up the manufacturer for technical advice, and repairs and spares were easy to come by. In that mythical dim and distant past, Dragon owners could be as solitary as they liked.

Alas this is not the case at present. With the mail order trade almost taking over completely, things are no longer that easy for people with a Dragon, which is why events such as the 6809 show (and others) have taken on a new importance.

News is looking good on that front — a show in Cardiff this Spring; a follow-up to the Dragon weekend is currently being organised. Microdeal are organising two Dragon conventions for later in the year and Database Publications (who have taken over the 6809 show) seem keen to hold both a provincial show (probably in Manchester) as well as a London event. You're almost spoilt for choice in fact.

However, this blossom of events forms a crossroads in the destiny of the Dragon. If well organised and well supported, they could trigger a Renaissance for the machine — if the opposite occurs the Dragon will be well and truly relegated to the category of 'Has Been'.

The opportunity and enthusiasm are there — the rest is up to you. Answers on a postcard please. . . .

Show time in South Wales

IT'S SHOW time again — this time in Cardiff. John Penn Discount Software and others have rallied round to organise a show in South Wales — Cardiff Airport to be exact — on Saturday, 15th February. The show runs from 10am to 5pm and entry will cost £1.00 for adults, 50p for the under 16s.

"We feel it's important to have this show for Dragon Users," said Hugh Pearson, speaking on behalf of John Penn. "With less and less retail outlets, it's important to get out and let the Dragon Users meet the people behind the Mail Order outlets — let the customers place a face to the voice on the phone."

Exhibitors include: John Penn Discount Software, Computape, Compusense and Peaksoft.

Also Design Design, Blaby Computer Games and Grosvenor Software.

Anyone wanting further details (including potential exhibitors) should contact Helen Penn on 04203 5970.

Extra Incentive

WERE YOU one of the eager arcade freaks trying to win the *Eddie Steady Go!* competition at the 6809 show recently? Well, Incentive are pleased to announce the winner of the competition — a Mr Kevin Rees of Headington Close, Basingstoke. On the Saturday of the show Kevin battled his way to a score of 9859 — and for this effort gets a prize of £25. Congratulations!

Never let it be said that Incentive software do not live up to their name. All purchasers of their imminent release *Moon Cresta* (based on that famous arcade game) will have automatic entry to a competition to win a spanking new Moon Cresta arcade machine. You'll have to invest a fair few hours playing the game though . . . a score of 30,000 qualifies you for entry to the big prize draw. Go for it!





Close up

ELECTRONICS enthusiasts everywhere have been waiting with bated breath for this one — the Pocket Inspection Microscope from Cobonic Limited.

These handy self-illuminated pocket microscopes are around six inches long, and weigh in at four and one half ounces. Cobonic are producing two models, the Spirig-30 (£18.90) which provides 30 power magnification and the Spirig-100 (£27.90) which provides 100 power.

For further information write to Cobonic at 32 Ludlow Road, Guildford, Surrey, GU2 5NW, or telephone 0483 505260.



Show time yet again!

FOLLOWING last autumn's successful Dragon "Weekend in Wales" (see *Dragon User* Jan 1986), Bob Morgan is organising a follow-up venture, to be held at the Trefeddian Hotel, Aberdovey in Gwynedd, over the weekend of 21st-23rd March. Events over the weekend planned are talks, demonstrations on a variety of subjects including Modens, Interfacing, Eprom blowing, Operating systems — and much more!

The cost, fully inclusive of accommodation and meals, will be £45 per person. Last year's event was oversubscribed, so Bob advises anyone interested to book early. Contact him via the Mid Wales Tourism Council, Machynlleth, Powys, SY20 8EE. Tel: 0654 2654.

Roysoft?

ROY COTES, author of the Jet Set Willy and Manic Miner Dragon conversions, is set to launch his own software label in the New Year. Called Microvision, it will concentrate exclusively on "high quality" Dragon tape software. The first two titles are both arcade adventures, one called Beanstalker, the other The Talisman. Roy is suitably mysterious about the details of plot concerning these releases, and their price, but expects both to be available around the beginning of February.

As well as programs penned under his own name, Roy also has plans to market third party software. "I get a lot of letters criticising other people's code — but not writing any themselves!" he said. "We're looking for programs!" He added enigmatically, "Whatever happened to Messenger Pete?" Enquiries to 25 Cleveley Road, Allerton, Liverpool, L81 9UN.

Disk tool

BERND Knechtel Software (no, it's not a misprint), a new German enterprise which describes itself as "a company which only produces good tools and utilities instead of worse games for your Dragon," have just released their first product, Disk Support Tool 1.1.

For further details, write (enclosing a sae) to Bernd Knechtel Software at Arnold-Wilhelm-Str. 9, 5630 Remscheid 11, West Germany.

Letters

This is the chance to air your views — send your tips, compliments and complaints to Letters Page, *Dragon User*, 12-13 Little Newport Street, London WC2H 7PP.

Pokes Galore!

Here are some more routines and pokes that I have discovered.

INVADERS REVENGE — POKE 14719,n before typing EXEC, where n is the number of lives from 0 to 255.

DONKEY KING — SKIPF: CLOADM to load. POKE 12914,n before typing EXEC. Where n is the number of lives.

PLANET INVASION — POKE 7438,n or POKE 10906,125 for infinite lives

SCARFMAN — Load as normal, POKE 2062,0 gives 256 lives.

LUNAR ROVER PATROL — POKE 22312,n.

BORIS THE BOLD — POKE 19411,n.

KATERPILLAR ATTACK — SKIPF:CLOADM to load. POKE 10739,n before typing EXEC.

CRAZY PAINTER — Type programe A listed at the bottom of the page. When loaded, POKE 9953,n where n is the number of brushes and pots of paint to a maximum of 64. Then type EXEC 16384

CUTHBERT IN THE JUNGLE — Type program A to load. Then type POKE 11452,n:EXEC 16384

SKRAMBLE — Type program A to load. Then type POKE 7300,n: POKE 7301, start stage number:EXEC4096

CUTHBERT GOES DIGGING — Type program A to load. Then type POKE 11675,n:EXEC 4096

HUNCHBACK — Load the game as normal. When running press the RESET button and type POKE 25384,n:EXEC 25280

TOUCHSTONE — Load as normal and press RESET when asked one or two players. Then POKE 22384,255:EXEC 16384. This slows down the generation of new monsters.

GALACTIC AMBUSH — Load as normal, press RESET when you have selected the colour and speed. Next type POKE 14783,125: EXEC 12936. This gives infinite lives.

COSMIC ZAP — Load as normal and press RESET during a game. Then type POKE 7981,13:EXEC 13569. This gives infinite lives.

DEVIL ASSAULT — Type program B as listed at the bottom of the page. When loaded, POKE 14279,n:EXEC 768

CUTHBERT GOES WALKABOUT — Type program B as below. When loaded POKE 15389,33 makes you immune to the monsters and POKE 13406,125 gives infinite lives. Finally type EXEC 768.

In all the above cases, n stands for the number of lives which you would like, and should be substituted for the number. It ranges from 0 to 255 unless specified.

I'm sure these pokes will be a great deal of help to many readers.

Program A

```
A=100:POKEA,142:POKEA+1,4:POKEA+2,0:POKEA+3,126:POKEA+4,183:POKEA+5,91:SKIPF:EXECA
```

Program B

```
A=30000:POKEA,189:POKEA+1,160:POKEA+2,146:POKEA+3,134:POKEA+4,57:POKEA+5,183:POKEA+6,1:POKEA+7,103:POKEA+8,57:EXECA
```

Games Aficiondo
(Alias Paul Burgin)
18 Moorcroft Road
Sheffield S10 4GS

Delta Dos

DUE to the demise of Premier Micro systems and not much information published by them freely I enclose a hint that may be useful to Delta DOS users.

If you wish to save a machine code program to tape from disk for backup purposes the normal tape peeks do not work.

First LOADM your program then if you PEEK(&H7A7C)*256+PEEK(&H7A7D) this will give you the start address of your program.

The end address can only be found by approximation as the DOS loads the whole domain of a program into memory, the end address is therefore found by reading the directory for the length of the program in memory, this is then multiplied by 256 and added to the start address already found by the above method to give the end address.

The exec address on Delta DOS is always the start address. I hope that this tip may help a few of your DELTA DOS users.

R. K. Osborne
18A Northdown Avenue
Cliftonville
Kent
CT9 2NW

Barons

HAVING just achieved a 100% score on completion of 'Barons of Ceti V' my wife and myself would like to make the following comments, some of which concern the game review in December's *Dragon User*.

1) A roll of wallpaper is not required to map the adventure. My wife produced a detailed easily understood, map on a piece of graph paper 17"×17". The map is complete with location symbols and is in colour
2) With the aid of the map and some initial observation it is possible not to lose fitness ratings at every nightfall.
3) The problems do get trickier as the game progresses, but with a little thought are solvable, especially at the end of the game.
4) As for the girl in the White City, after several Terran Twists, she will . . . But that is a problem for other adventurers.
5) For a different view of the adventure try the following:-
   a) Part load a saved character
   b) Rewind tape
   c) Fully load the saved character
   The results (found by not properly preparing our save tape) are guaranteed to give a quiet chuckle!
6) 'Barons of Ceti V' is a super adventure which gives many enjoyable playing hours.
7) Finally, proof of our 100% score is in the final message, which can be verified by Wintersoft, and reads as follows:-
   Ice blue flames envelop your vanishing consciousness as you fall through the transdimensional vortex . . . to be continued in Juxtaposition part 2; 'Usurper of Rune'.

Martin and Jill Boulton
4 Merryfield Road
Weston-Super-Mare
Avon BS24 7DN

6809 Flop?

WHAT a waste of time, effort and cash this year's 6809 show was.

After spending £25.80 on my train fare and £3.00 to get in, I was totally disgusted to find that Tandy and Blaby were the only stalls with software for my Tandy machine, and most of the games on the Tandy stall I had already got.

I know that Tandy have a tight rein on licencing but this was ridiculous. All I can say is that this is the first and last time I will be attending this show and for all Tandy owners, I can only hope things improve soon.

M. Johnson
26 College St
Boulton Estate
Birmingham
B18 7PD

No go Show

THIS is the first time that I have written to you. I am writing to let you know of my disappointment over the latest 6809 show held this weekend. I attended both of the previous ones which in my opinion were much more lively, informative and well attended.

For the other shows I arrived early and left about noon when things were getting hectic with the usual long queues forming. This time no long queues and not really enough inside to justify the entrance price of three pounds. In fact your magazine covers the latest products and developments much more thoroughly.

I shall of course continue reading your magazine and give the shows a miss. Let's face it I can buy several issues for the entry plus travelling expenses.

M. J. Pinner
43 Charterhouse Avenue
Wembley HA0 3DD
Middlesex

Can man live by magazines alone? Was the show that bad? Answers on a postcard please . . .

THE DRAGON COMES HOME TO WALES

We invite you to meet the leading stockists of Dragon software, hardware and peripherals. Come and pick up some amazing bargains at the Cardiff-Wales airport on Saturday, February 15, 1986.

BLABY COMPUTER GAMES

See our large range of software for the Dragon and Tandy, including many new games.

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Flex operating system: Dragon Plus and professional business software: Distributors of Dragon hardware.

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The only software company to make your Dragon chips fry not cry.

DATAPEN MICROTECHNOLOGY LTD.

Datapen will be demonstrating their light pens and the new Dragon Draw software. Both will be available at special show prices.

DESIGN-DESIGN

Meet the faces behind the name.

ECLIPSE-FENMAR LTD.

Eclipse-Fenmar will be displaying TOTAL ECLIPSE. Come along and meet the master gamer himself: Veebo-Zogrod of Grogfax.

GROSVENORE SOFTWARE

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Dedicated to supplying low price, high-quality software for the Dragon.

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Peaksoft are promising Britain's best deal on a wide range of joysticks, books and add-ons — including an incredible £100 discount on the Touchpad Graphics tablet.

10.00 am-5.00 pm

Entrance fee: £1.00 (adults) 50p children (under 16)

Show to be held in the Conference Room, 3rd floor, Cardiff-Wales Airport, Rhoose near Cardiff. For the Cardiff-Wales Airport follow the signs from the M4 and A48. Plenty of car parking available.
Half hourly bus service (No. 351) from Cardiff Centre.

Refreshments available in departure lounge.

For further details ring John Penn: Bordon (04203) 5970

Communication

Send in you questions, requests, and pleas to Communication, Dragon User, 12-13 Little Newport Street, London WC2

Communication, as defined by the Extremely Small Pocket Oxford Dictionary, is the 'imparting or exchange of information' . . . and this is what 'Communication' in Dragon User *will be all about too. As commercial technical and software support for our computer wains, we get ever increasing amounts of mail on a variety of subjects, all asking for help and information — more than our Supremo Brian Cadge could ever handle. So this is your chance to reach many thousands of Dragon owners who might be able to help you — and, of course, if you can help someone — why not drop them a line?*

Shortage

AS I am living in Norway I am beginning to feel the shortage of programs for the Dragon Computer. I am the happy owner of a D64, double disk Dragon DOS and some software.

I think I might be reckoned as a serious user of the D64 . . . I want to use it in my work programs. We have some Dragons at school, but we are now getting rid of them.

Please, I want to get in touch with teachers who are using the Dragon in schools. Perhaps we can help each other in getting useful software for our teaching.

Please, send me a letter and we might get into action making/exchanging software for educational purposes. . . .

John Egil Haug
PO Box 18
N-1662 Rolvsøy
Norway

Transformer

LAST Christmas I eventually received a Dragon 32 computer. After two months the powerpack had burnt out. Unfortunately, the computer was second-hand and out of guarantee. I have just read the letters page in the latest *Dragon User* to find that Touchmaster no longer stock it. Please could anyone tell me where to purchase a new transformer?

John Moore
3 The Maltings
Warminster
Wilts
BA12 8JR

MY SON has been the owner of a Dragon for over two years and has built up quite a selection of software and accessories. Unfortunately for the last six months his computer has been lying unused because we have been unable to purchase a transformer. We have written to various firms and asked at computer repair shops, but as it is a sealed unit, we have had no success. Please, please let me know if his computer will ever be in working order again.

Angela Barnett
Kessockbank
Pitblae
Fraserburgh

Communication

Stuck for a routine? Need some obscure equipment? Feeling cut off? Fear not — someone, somewhere can help you! Write down your problem on the coupon below (make it as brief and legible as possible) together with your name and address and send it to Communication, Dragon User, 12/13 Little Newport Street, London WC2H 7PP. We'll publish it as soon as we can — meanwhile, maybe there's someone you can help this month!

Problem..
....
....
Name ....
Address..
....

Dragon User People's Chart

'Power to the People' is our motto here at Dragon User — so this month (and every month!) we are now going to offer you the chance to air your personal preferences to the software producers, by voting in the Dragon User People's Chart.

Ever since the majority of retail outlets ceased stocking Dragon programs (so that sales are now even more difficult to assess), the Dragon scene has lacked that one thing any self-respecting micro must have — a chart. Love it or hate it, a chart is a useful thing, if only to check to see if everyone else shares your good taste.

So, ever with the reader in mind, we are now instigating a People's Chart — for you to vote for your top five Dragon programs (games, utilities or applications) each month.

And just to make it that little bit more interesting, this month Microdeal are offering £25 worth of software (of your own choice) to the winner of our associated anagram competition. Who said anything about a competition?

Well, to make things even more interesting than that, we're asking you to construct an anagram from your top three — the cleverest winning the goodies. Give it a try . . . you know it makes sense!

This is what you do

Each month, Dragon User will be compiling its own special Dragon software Top Ten chart — compiled by you!

And each month we will be sending £25 worth of Microdeal software to the person who sends in, with their personal top five, the most original phrase or sentence made up from the letters (you don't have to use them all) in the titles of their top three programs.

You can still vote in the chart without making up an anagram — but you won't be in with a chance of winning the prize.

All you have to do is fill in the form below (or copy it out if you don't want to damage your Dragon User) and send it off to: People's Chart No. 1, Dragon User, 12-13 Little Newport St, London WC2H 7PP.

Chart One

Voting for Chart No. 1 closes at 1pm on Friday 14th February 1986. Entries received after that time will not be eligible for inclusion in that month's voting. The editor's decision is final. Only one entry per individual per month will be allowed.

My top 5: Voting Month 1
1...
2...
3...
4...
5...

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Show Business!

*He came, he saw, he did a little shopping — **Jason Orbaum** gives one man's opinion of the Third 6809 Show . . . his own*

OVER the weekend beginning the 21st of November 1985, some 7,000 people (estimated by the organisers) found their way to the Royal Horticultural Halls, London (and I mean found, this was the first time that I have not become lost on the way!) for the latest 6809 show.

On arrival I must admit to being a bit worried, as when I drove past the outside at five past ten there was no queue. Indeed, when I got inside, there was room to move; in fact, there was room to break-dance! This situation changed quite fast though and by late morning there were a fair number of people buying, chatting, and playing.

Most of the firms one would expect were there. However, Design Design (rumoured to be due to a mix-up of dates), Cable, and Adventure International were notable for their absence (although the Scott Adams adventures were on sale from Computape).

So, having had a brief, anonymous look round, and been greeted with an enormous degree of friendliness from most firms, I put on my official Dragon User hat and then set off to talk to various people in detail.

Microdeal

I suppose I had to talk to the giants first. They were there with the usual cube of screens displaying their latest and best games — one of which, Shocktrooper, is reviewed elsewhere in this issue — and selling an incredible range of titles over three stalls.

As most people are now aware to achieve games from Microdeal you have to resort to mail-order. There is a very good reason for this, according to their director, John Symes, "It's the only way for us to carry on." It is mainly blamed on the fact that sales in general have declined for Microdeal. However, I am pleased to be able to say that my experience of Microdeal's mail order service reveals it to be very efficient (now).

Their recent roadshow, they say, has achieved a moderate success, and although profits have been low, they have enabled Microdeal to maintain a very high public profile for themselves and the Dragon.

And the mind of Microdeal has not been dormant. They have been busily scheming and plotting for a "Dragon Convention"! The convention would be very different from the shows such as this one which have been described by many as a form of "Dragon Owners' Jumble Sale." The convention would be in London or Manchester most probably, and Tandy amongst other firms have pledged their support. The convention would feature less stalls, but would include guest speakers, and, indeed, the event could well be an overnight affair at a hotel.

As for what's new on the games front, Microdeal have acquired the rights to my rave of several months ago, *Screaming Abdabs*, and are planning to release a new adventure ("We find that adventures have a very long shelf life", John Symes again), *The Vortex Factor,* plus a 3-D Battlezone which is not only cheaper, says they, but BETTER than Rommels Revenge, and a game entitled *Aquanaut 471*.

John also pointed out to me that at the back of BYTE magazine one can find adverts for the Dragon computer "from the BBC." . . . Hmm, the plot thickens!

In all, Microdeal's attitude to the Dragon is VERY optimistic, and suprisingly real.

Cumana

Cumana now offer Dragon-Dos with their disk drives rather than Delta-Dos, but I was unhappy to find that this is not true Dragon-Dos, in fact, Cumana-Dos (as it is called) is only "compatible" with Dragon-Dos, whatever that means.

Cumana continue their after sales support through their Guildford office, and still offer drives up to a double drive, double sided, 80 track, Double Density configuration.

Incentive

Incentive had enjoyed a very good show with *Eddie Steady Go!* selling well and the *Ket Trilogy* enjoying a continued steady sale (cf Microdeal.) They saw no reasons for not attending the next show to launch or promote their game *Moon-Cresta* which, licenced from Nichibutsu who produce the arcade game with the same name, should be available in January or February.

Incentive were offering a twenty-five pound prize to those who put up the best score of the weekend on *Eddie Steady Go!* . . . I didn't have the heart to win it!

They pledged continued support for the Dragon provisional upon sales of *Moon Cresta* (yes, it sounds a bit dodgy to me too!).

Blaby

Blaby felt that the show had gone extremely well, although they felt that from about 2.30 onwards on the first day it was a bit of a disappointment (a feeling echoed by many of the other firms present).

They were interested in how sales would go through winter and were soon to release *Starman Jones*, the sequel to the superb *Caverns of Chaos* based loosely around the Spectrum game called *Lunar Jetman*, and version of *Q*bert*. Some of their other new releases to be reviewed soon include a Kung-Fu game (the first of three I received at the show).

Blaby were an exceptionally open and friendly company who had most of their programmers present at the show and were quite happily chatting with anyone who came to the stand, not just reporters. They told me that *Cosmic Crusader* was written without an assembler, ie hand coded — someone give that programmer immediate entry to the Masochists Club of Great Britain!

John Penn

John Penn described the show as "the best we've been to yet". As many people know, they have bought up all of Webster's old stock and are selling great amounts of software at a great discount including *Manic Miner* at four pounds! The company's policy is one of continued support of the Dragon whilst "looking" at other computers.

Computape

Computape were the most pleasant people I met all day. Their enthusiasm and love of the Dragon, together with their sense of business acumen, made them a firm which deserve and will get support.

Computape described the Saturday as bad but the Sunday as, "amazing", in terms of sales and enthusiasm. They are also trying to arrange a show, this one in Wales, for which they have support from, among others, John Penn, Peaksoft, Wintersoft, Grosvenor software, and Compusense.

They are now the sole supplier of Cable Software and they have the licences to a game called *Ninja Warrior* (reviewed soon) and the infamous *Madness and the Minotour*.

Their enthusiasm comes from the fact that their head man was, originally, a Dragon owner and is still a great enthusiast . . . he knows what he wants to sell, because he knows what he likes to play! Computape were also representing Adventure International at the show selling a good number of the Scott Adams adventures on

the Dragon. Asked if they would continue their support of the Dragon they had one word: "Absolutely."

Quickbeam

Sales of Quickbeam software were, apparently, down on those of last year, but they promised continued support provided sales of their new games are high (hmm, heard that somewhere before!)

Their latest releases are *6809 Express* and the soon to be released *Shaolin Master*, a Kung Fu game along the lines of that which is very popular in the arcades (the one which involves duels). Advanced orders of *Shaolin Master* at the show exceeded sales of *6809 Express* and both will be reviewed soon. The Disk version of *Shaolin Master* (Dragon-Dos only . . . Grr . . .) will include speech.

Quickbeam were quick to point out that they are open to any new software being written by Dragon programmers and offer a 20 per cent royalty scheme across the board.

Wintersoft

Wintersoft had found this show much better than the last in terms of sales, a fact which, they felt, was due to the launch of their new game *Juxta-Position*. They say that they will from now on only be present at shows if they have new projects to exhibit. They have no plans at the moment except to continue supporting the Dragon and will be releasing *Userper of Rune* (the second Part of *Juxta-Position*) soon. The plot will take over after the crossing of the Juxta-Position to a land of magic. This adventure will be more along the fantasy line than the sci-fi of *Barons of Ceti-V*.

Compusense

Compusense had found the show much quieter than last year but had done about the same amount of business. Their main item was their Dragon Hard Disk system, incorporating 80 column card and 128k expansion which will retail for about a £1,000 (which is actually very, very cheap for the product). The expansion runs with Edit+ and does not need flex, although it is advisable.

The storage of a single hard disk is the equivalent of 25 *boxes* of disks and this system is also over four times faster! The driver software contains on board ROM and RAM and may include a timer.

To give some idea of the economic pricing of this unit Compusense pointed out that to buy *just* the hard disc part of the expansion for the BBC would cost a £1,000. The unit, by the time you read this, will be available for both the Dragon 64 *and* the 32.

Amongst the many others displaying were Smithson Computing who were showing the excellent Electronic Author word processor, and were previewing a new game. There were also various companies selling Discs, T-Shirts, Books, etc., at low prices . . . there were certainly many bargains to be had.

The general mood of the show then was one of excitement but a rumour reached me that the next show could well be the last. This, I feel, would be a great shame as the 6809 show is one of the things that has helped to keep the Dragon alive.

If Dragon owners wish to ensure a prosperous future for their machine it is up to them to attend the shows that provide the life blood for the machine. Roll on the next one!



Taking the tablets

Renaissance man ***Mike Gerrand*** *takes some time off from adventuring to try out the Touchmaster Touch Tablet*

MOST PEOPLE will know Touchmaster as the name of the company that rose out of Dragon Data's ashes with the intention of providing software and support for our dearly beloved computer, and Touchmaster *is also the name of the Touch Tablet now available for the Dragon as well as several other micros. But don't just take a quick look at the incredibly detailed and colourful graphics used in the magazine ads to illustrate what can be done with a Touch Tablet, as results like that are not achieved without hours of painstaking effort.*

A Touch Tablet is simply a pressure sensitive pad which attaches to the computer, and on making contact with this with the appropriate pen/stylus the results can be seen on screen and also normally saved to disk or tape, thereby allowing non-programmers (and even programmers) to produce the graphics they want without resorting to a long list of the computer's own BASIC graphics commands. Most Touch Tablets have a freehand mode, allowing you to scribble on screen to your heart's content, while along top, bottom or side of the actual drawing screen on the tablet will run a list of the commands and colours available, each of these again accessed by a touch of the pen.

Touchmaster itself comes well packed in the trusty styrofoam box, and as well as the pad you get a stylus, interface, transformer, pad overlay, *Multipaint* cassette and appropriate manuals, if you can call eight or 12 pages a manual. The transformer is scarcely bigger than a regular three-pin plug, and with the interface plugged into the pad and the Dragon's cartridge port, you're away. The interface is made up of a lengthy enough three foot ribbon cable, and the connection also has an expansion bus duplicating the cartridge slot, which has been slightly modified to work with both Dragon and Premier drives connected.

The stylus is simply a plastic pen with a rounded end, though in fact pressure can be applied with almost anything that won't damage the pad or any overlays being used. Better stick to the stylus while changing commands, and I used the top of a ball-point pen for this ... using the writing end might have had rather disastrous results.

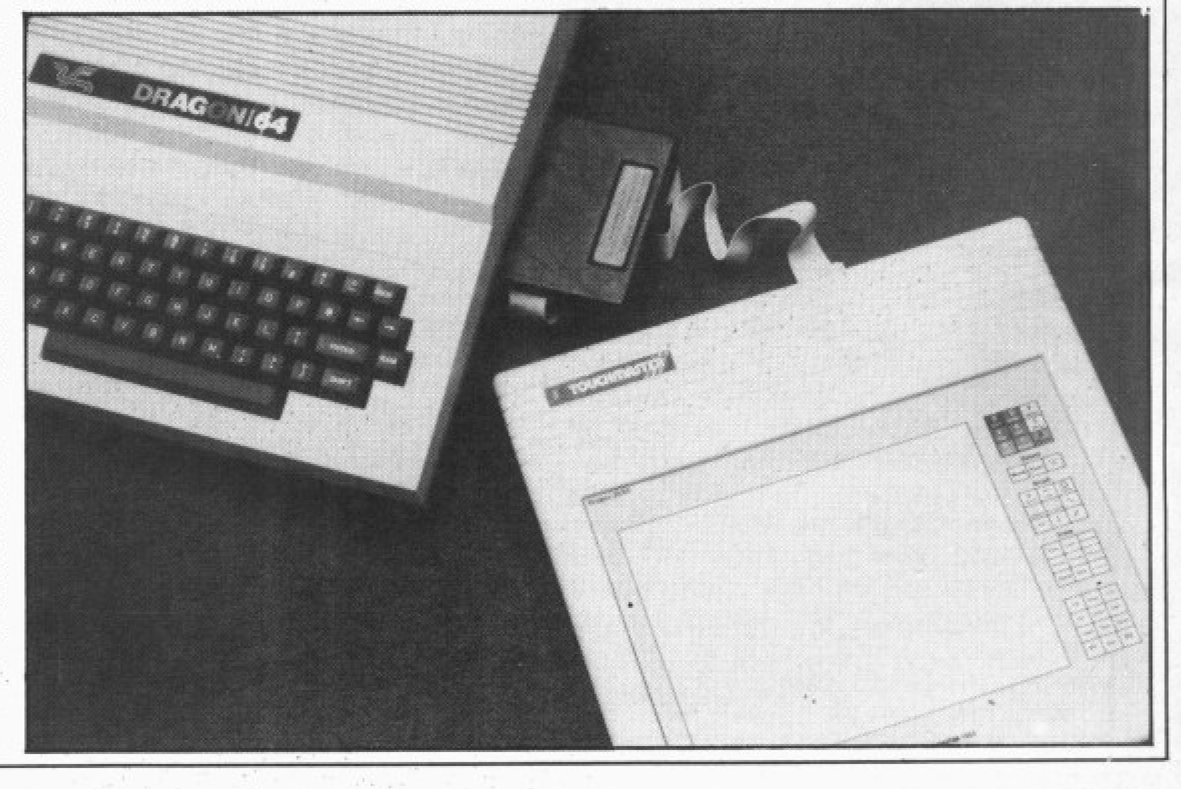
Documentation is one of the package's downfalls, as the *Touchmaster* User Guide is a small 12-page booklet covering all machines, and apart from connecting up and a few lines on taking care of the hardware, all you get is one simple program which prints the co-ordinates on screen when you touch the pad with the stylus.

The User Guide for the *Multipaint* software provided is better, but still leaves room for improvement. The opening page, for example, tells you that "Your masterpieces can then be saved on tape or disk to be incorporated into your own programs later". Unfortunately it doesn't go on to explain how to do this, and as each of your masterpieces is saved in a machine code program; the average BASIC programmer will be at a loss as to how to incorporate these. Instructions about the various commands such as LINE and SQUARE are also minimal — the kind of instructions where, once you've experimented for yourself to get the hang of things, you then understand what they were trying to tell you.

To use *Multipaint* you'll need your Dragon manual by your side, unless you know by heart the various MODEs and colour sets available. You firstly select the MODE you wish to work in by pressing the MODE box followed by a number from zero to four, trying not to be put off by the wierd things that happen to the screen while you do so, though if you want really wierd results try working in the allegedly non-existent MODE 5: Picasso watch out. Next you select a PAGE for the start of the graphics screen, followed by whichever of the two available colour sets you want for the chosen MODE. After that, you're away.

You can clear the screen to whichever background colour you want, and then work in the other available colour(s) . . . well, you can draw in the background colour if you wish, but don't ask me to peer at the results. Colours used obviously match the colour numbers on the Dragon, and beneath the box containing the nine colours/numbers, and the one for MODE/PAGE/Colour Set, is one offering nine types of brush stroke. These are a simple point, a circle, square or rectangle, and a choice of lines at five different angles. The width of these can be adjusted by pressing a number box, then the colour you want to work in. Using the same box for colours and numbers can be a little confusing, as your first press can result in two successive 'clicks' registering, meaning you'd be working in the colour that happens to be the same number as your brush width, and you have to resort to the OOPS box to withdraw the commands and start again.

In addition to freehand you can also produce various set shapes, these being a line, triangle, rectangle, circle, elipse, parallelogram and polygon. They can be any size, and are easily obtained by setting one or two cursor points on the screen, then moving the stylus point around the screen till you see the exact result that you want. Any command can be taken back using OOPS, and nothing is set in the picture till you confirm it with ENTER. The FILL command will put any available col-



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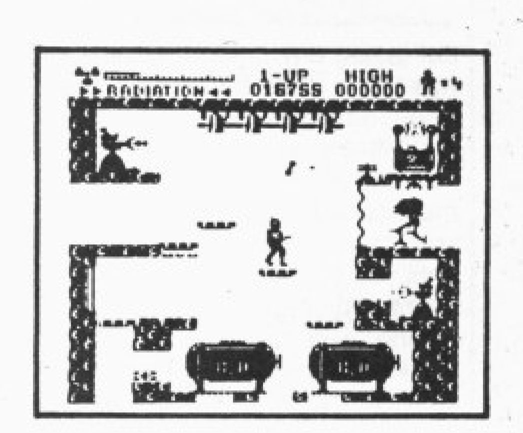
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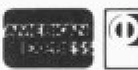
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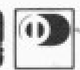
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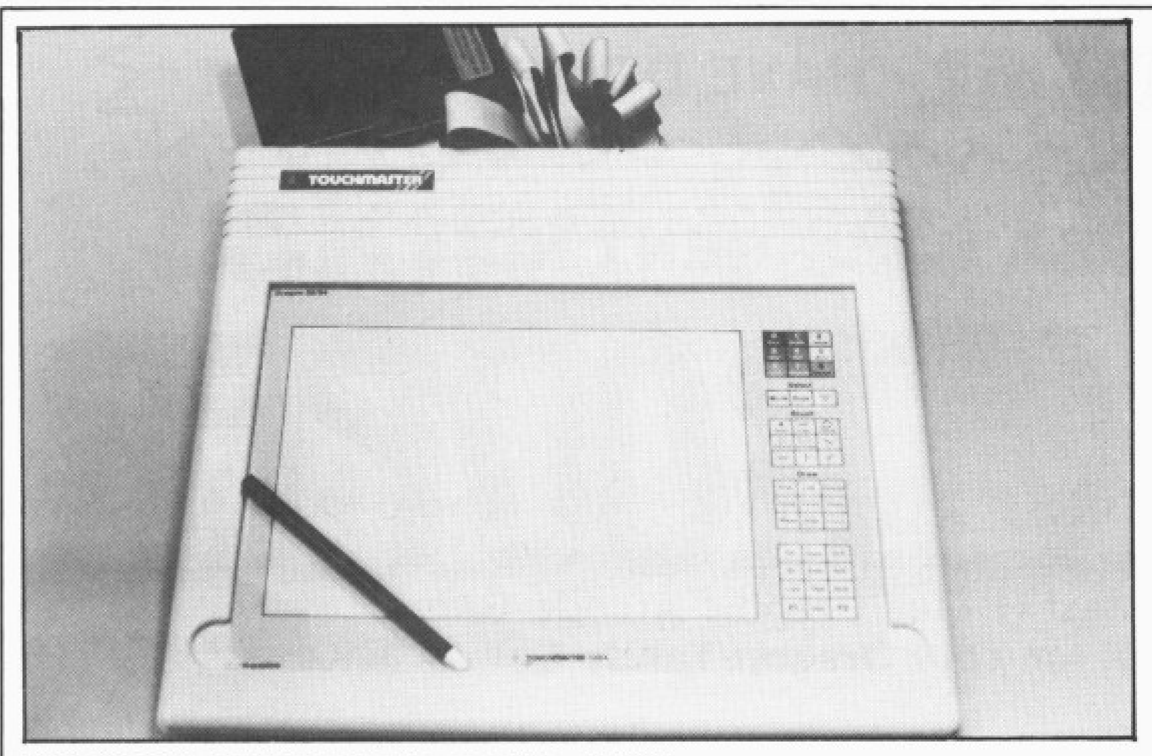
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our inside any *continuous* border, and this has two drawbacks. One is that in freehand mode the pen has to be pressed very firmly along the design to obtain a continuous line, and so it is quite easy for the occasional pixel not to register, which you can't easily spot on the screen . . . until you try to fill the shape and the colour bleeds out to go looking for another border of the appropriate colour. This usually results in the whole screen being filled. OOPS! The second drawback is that you can't FILL a shape which has borders of contrasting colours, but that's not exactly a disaster and you can get round it with a little effort.

Other commands not yet covered are boxes for SAVE and LOAD, TAPE and DISK, all these being well prompted, while the CLS to clear the screen is guarded with an option for you to OOPS or GO on to choose the colour of the new screen.

So far so good, or reasonably so, but *Touchmaster* does have problems, mainly to do with the actual sensitivity of the pad. As mentioned before, pressure on the stylus has to be pretty firm, and this does inhibit the freehand drawing somewhat. The other occasional problem I had was in the program hanging up on me. Sometimes in freehand mode, wishing to capture the latest bit of artistic miracle for posterity, there would be no 'click' when I tried to press ENTER. In fact I couldn't OOPS, CLS, SAVE or anything. Occasionally the reset button returned me to the program, with part of the masterpiece preserved in memory, though sometimes it required a re-LOAD of the *Multipaint* program.

These are irritations, but as long as you SAVE your work in progress regularly, and don't mind having to make several attempts to get the results you want, *Touchmaster* can produce very effective graphics, the best I found being the impressionistic freehand efforts, though you will have to lay in a goodly supply of graph paper of some kind for the best preplanned results. It's expensive and its faults annoyed me, but I must admit that after a few hours I was becoming very pleased with the graphics appearing on screen.

Of course you don't need to use *Multipaint* with *Touchmaster,* because Touchmaster Ltd has produced a range of software that makes use of the Touch Tablet's facilities, some ten of their titles being available for the Dragon. Our review copies have been mainly educational titles, which are no doubt, putting the tablet to its best use, but you can also get *Othello, Draughts*, a graphics adventure called *Perilous Castle* and Romik's strategy game, *Strategic Command* — Romik is the software house behind *Touchmaster*, incidentally, and this is inevitably reflected in the initial software available.

Strategic Command seemed to gain little by being linked up to a Touch Tablet, particularly as the software is packaged in large plastic tubes. This is one way of dealing with the 11″ × 8″ overlays needed, but when unpacked they become almost impossible to lay flat on the tablet unless you've got a handy steamroller to press on top of them for a few days. I certainly wouldn't buy *Touchmaster* just to play games on, as this is more of a novelty use than a practical one, and I was much happier playing the boring old un-*Touchmaster*'d *Strategic Command.*

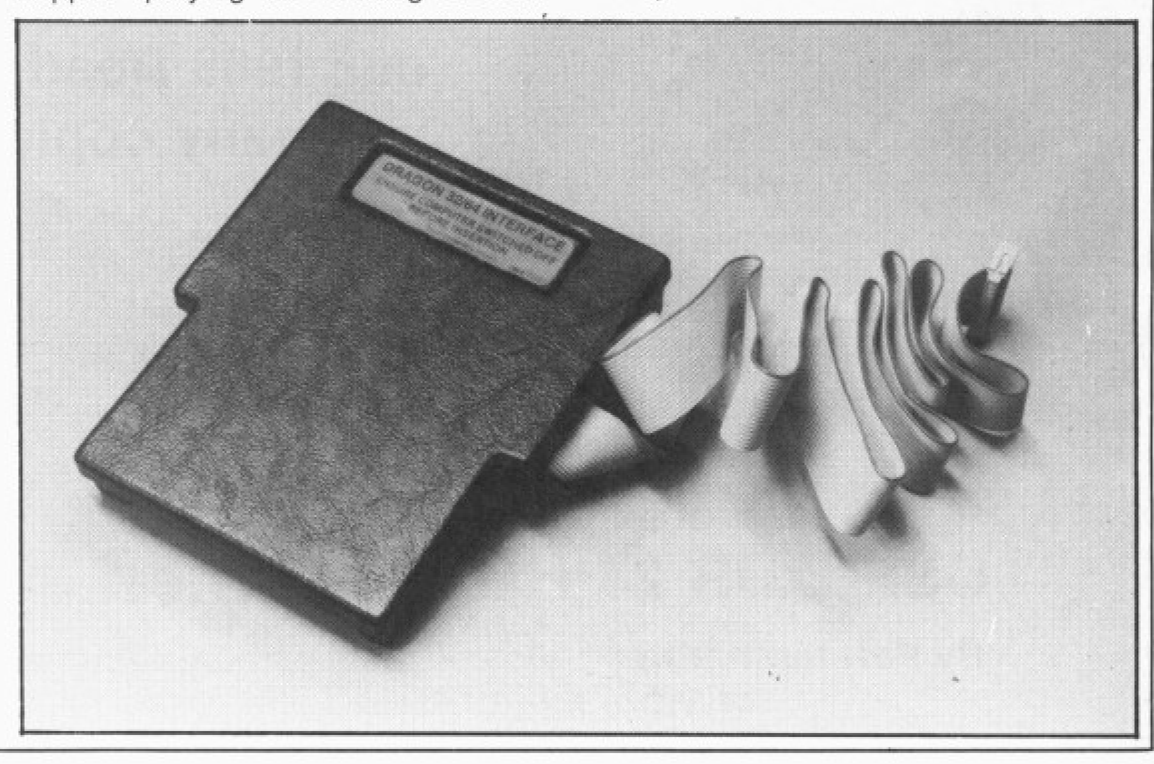
Where this package does come into its own, though, is in its use for young children who aren't yet ready to cope with a confusing keyboard. There are five educational packages, designed to test observation, memory, shapes and colours. *Simon Says* is initially a build-a-face game, from a selection of eyes, noses, ears etc, and then the child can choose to have various features on the face change, any number between one and eight, and he or she must remember the sequence. Reward is an amusing animation of feeding a cat.

Simon Saw shows you a completed jigsaw on the screen, of eight, 12 or 16 shapes according to the level selected, and when this is broken up the child must recreate the picture a shape at a time by matching on the overlay the shape that is flashing on the screen. Graphics on this are very nicely done, and it's a game both appealing and educational. *Simon's Shapes* presents an overlay showing eight different shapes and six colours. On the first level the child must simply match a shape on screen with one on the overlay, and on the second level both shape and colour must be matched. Third level is back to matching shapes, but this time in order to construct a picture.

Simon's Squares and *Simply Simon* roughly follow along in the same vein — I would say all of the programs are definitely of some educational value.

So what about the system as a whole? At the original price of £149.95, the Touch Tablet was an expensive piece of equipment — certainly not an impulse buy. But at the present price of £52.50 (including five programs) comes into the casual buying price range for someone looking for new avenues to explore on their Dragon. Recommended.

Hardware: *Touchmaster Touch Tablet.* ***Price:*** *£49.95 plus £3.00 postage and packing (mail order only).* ***Supplier:*** *Touchmaster Ltd, Unit 9, Baglan Industrial Park, Baglan, Port Talbot, West Glamorgan, SA12 7DJ. Tel Briton Ferry 820310.*



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The Third Dimension

An introduction to three-dimensional graphics
by ***Peter Whittaker***

IN THE article on two dimensional graphics (Dragon user December 1985) we dispensed with the DRAW command, in favour of a co-ordinate based system using the LINE command to join the various points together. To extend this technique into the third dimension is really quite simple. First we must modify our matrices to handle the extra dimension, and then we must derive an equation to translate the three dimensional co-ordinates into two dimensional points on the screen. I will deal with the matrices used for manipulating an object in three dimensions first, and then go on to a method of calculating the translation to screen display.

Table One shows how to calculate an objects new position after being transformed by a matrix. The co-ordinate system (X,Y,Z,1) is multiplied by each column of the transformation matrix. The total from each column of multiplications will be the new co-ordinate value. Table Two gives all the basic matrices we will need to move objects through three dimensions.

Listing One uses the derived equations to rotate a pyramid about its centre. Because the program first counts the number of co-ordinates in the object, we can change the data statements, and the program will happily move tanks, aeroplanes, or any other object around the screen. Insert a "REM" in Lines 320, and 340, and the program will change the pyramid for a tank. "REM" Lines 360, and 370 and the program will rotate a plane. If you insert your own data lines, they must be terminated with a 999 to indicate that the last co-ordinate has been read.

Matricies

As with the matrices used for two dimensional graphics, two or more matrices can be multiplied together to give more complicated movements. (It is very important to make sure that the matrices are multiplied together in the correct order, because if they are not then they will produce a different net movement than that which is desired.) Each row of the first matrix must be multiplied by each column of the second matrix, (see Table Three). Listing Three is a program for multiplying matrices together. When the values are entered for two separate matrices, the program will print out the values for the new combined matrix. Table Four shows how two rotation matrices can be multiplied together, and the resulting equations can be inserted into the program. Change Lines 220-240 to *XT=X★CC+Y★SS★SS+Z★CC★SS, YT=Y★CC+Z★−SS, ZT=X★−SS+Y★SS★CC+Z★CC★CC* and the pyramid will now rotate about both the X-axis and the Y-axis together. However these three dimensional matrices are based around the origin (0,0,0). If we move the pyramid away from the origin (put a "REM" in Line 320, and use the DATA from Line 340), then it will rotate in orbit about the origin and not about its own centre. If we wanted it to still spin about its own centre, we would first have to move it back to the origin, then rotate it, and then move it back out again. Change Lines 220-240 to XT=X YT=Y★CC−Z★SS+20★CC−20★SS+20 ZT=Y★SS+Z★CC+20★SS+20★CC−20. This will now rotate the pyramid about its own centre, without it orbiting the origin.

3-D Movement

Now that we can successfully move objects around in three dimensions, we need to be able to convert the objects position into flat screen co-ordinates, without loosing the depth perspective of the three dimensional object. To simplify calculations, I have located our viewpoint on the Z-axis, looking directly towards the origin. If we wanted to view the object from a higher point, this would be done by keeping the eye in the same place, and moving the object down. Similarly, we can appear to orbit around the object by rotating it in the opposite direction. Fig Four shows how by remaining on the Z-axis, we can then calculate the screen position of a point, from its known three dimensional location.

In the diagram, Xt represents the X-displacement of the object from the Z-axis. If we draw a line from this point to the eye, the point *Xs* will represent the point on the screen which will appear identical to the point *Xt*. We have set the distance from the origin to the screen at 40 units, and so the distance of *Xt* from the screen will be *40+Zt*. If we call the distance between the screen and the eye "*D*" then we can derive the relationship *Xs/D=Xt/(D+Zt+40)*. Rearranging this equation, we get *Xs=Xt★D/(D+Zt+40)*. Finally, to give some control over the size of the drawing, we include a scaling factor, and offset the origin to the centre of the screen, before drawing the picture to the screen, *Xs=125+S★Xt★D/(D+Zt+40)*. Similar calculations lead to the equation *Ys=91−S★Yt★D/(D+Zt+40)* for the Y co-ordinate. Try experimenting with the values of *D*, *S*, and the distance of the screen from the origin (40), to see the effect this has upon the illusion of depth.

Although the program works well, it is quite slow. The pyramid moves slowly, the plane moves slower, and the tank moves

```
(Xt,Yt,Zt) = (X,Y,Z,1) * (a e i m)
                         (b f j n)
                         (c g k o)
                         (d h l p)

Xt         = (X,Y,Z,1) * (a . . .) = Xa+Yb+Zc+d
                         (b . . .)
                         (c . . .)
                         (d . . .)

Yt         = (X,Y,Z,1) * (. e . .) = Xe+Yf+Zg+h
                         (. f . .)
                         (. g . .)
                         (. h . .)

Zt         = (X,Y,Z,1) * (. . i .) = Xi+Yj+Zk+l
                         (. . j .)
                         (. . k .)
                         (. . l .)
```

Table 1 - Matrix Multiplication

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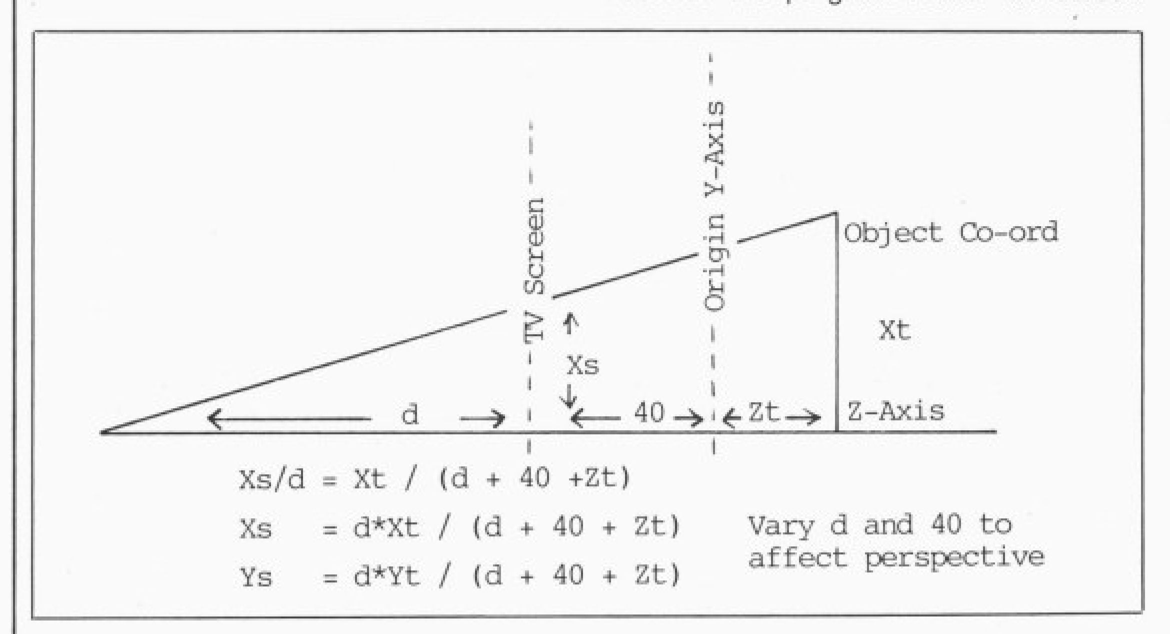
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even slower still. This is because of the increasing amount of number crunching required as the number of co-ordinates required to draw the object increases. It is not possible to speed up the program without resorting to machine code. However, by turning to "offline animation" we can make the object move much faster, Listing Two will spiral a tank around the screen, giving perspective views from below and above as it wanders over the screen. (Insert a "REM" in Lines 610 and 620 to change the tank for a plane.) When RUN, the program will display an option list and wait for a keypress. Press <G> and then go and have a cup of coffee whilst the program number crunches for five to ten minutes. The program will calculate all the screen co-ordinates needed to draw the moving object, and then save them to the protected memory above address 20000. If the program does not crash due to the object moving out of range of the screen display, the program will return to the menu screen once the memory reserved for data has been filled. In either case, the data can now be saved to tape by pressing <S>, or run by pressing <R>.

When the <R> option is selected, the program will display the tank spiralling around the screen. Each tank is drawn on graphics pages five to eight, and once completed is copied to the display screen. Because the program reads the screen co-ordinates from memory, and has very little number crunching to do, the tank will move quickly, with hardly a pause between each successive picture.

If the *<S>ave* option is selected, the data is saved along with a count of the number of co-ordinates in the object. When reloaded <L> this count enables the program to run data from any object with any number of co-ordinates, without having to enter the number of co-ordinates separately.

Unlike Listing One which used an updated array system to carry the co-ordinate data, Listing Two reads the data from data statements. This reduces the complexity of the matrices required to manipulate the objects. Instead, the matrix values are constantly updated, and the co-ordinates recalculated.




```
Rotate θ About X-Axis * Rotate φ About Y-Axis

( 1    0     0    0)   (cos0  0  -sin0  0)
( 0  cosθ  sinθ  0)  * ( 0    1    0    0)
( 0 -sinθ  cosθ  0)    (sinφ  0   cosφ  0)
( 0    0     0    1)   ( 0    0    0    0)

(cos φ        0      -sinφ       0)   CP = cos(φ)
(sinθsinφ   cosθ   sinθcosφ     0)   SP = sin(φ)
(cosθsinφ  -sinθ   cosθcosφ     0)   CT = cos(θ)
(   0         0        0         1)   ST = sin(θ)

Xt = X*CP + Y*(ST * SP) + Z*(CT *SP)
Yt = Y*SP + Z*ST
Zt = -X*SP + Y*(ST * CP) + Z*(CT * CP)
```

Table 4 - Multiplication using two rotations

```
( 1    0     0     0)   (cosθ   0   -sinθ   0 )
( 0  cosθ  sinθ   0)   ( 0     1     0     0 )
( 0 -sinθ  cosθ   0)   (sinθ   0    cosθ   0 )
( 0    0     0     0)   ( 0     0     0     0 )
  Rotate about X-Axis     Rotate about Y-Axis

(cosθ sinθ  0     0)   ( S     0     0     0 )
(-sinθ cosθ 0     0)   ( 0     S     0     0 )
( 0      0  1     0)   ( 0     0     S     0 )
( 0      0  0     0)   ( 0     0     0     0 )
  Rotate about Z-Axis     Scaling

( 1    0    0     0)   (-1     0     0     0 )
( 0    1    0     0)   ( 0     1     0     0 )
( 0    0    1     0)   (-0     0     1     0 )
( TX   TY   TZ    1)   ( 0     0     0     1 )
  Translational           Reflection in Z/Y Plane
```

Table 2 - Three Dimentional Transformation

```
                 C1C2C3C4
R1 (A E I M)     (a e i m)
R2 (B F J N)  *  (b f j n)     Multiply each row of
R3 (C G K O)     (c g k o)     Matrix 1 by each column
R4 (D H L P)     (d h l p)     of Matrix 2.

   (R1C1  R1C2  R1C3  R1C4)
 = (R2C1  R2C2  R2C3  R2C4)
   (R3C1  R3C2  R3C3  R3C4)
   (R4C1  R4C2  R4C3  R4C4)

   (Aa+Eb+Ic+Md, Ae+Ef+Ig+Mh, Ai+Ej+Ik+Ml, Am+En+Io+Mp)
 = (Ba+Fb+Jc+Nd, Be+Ff+Jg+Nh, Bi+Fj+Jk+Nl, Bm+Fn+Jo+Np)
   (Ca+Gb+Kc+Od, Ce+Gf+Kg+Oh, Ci+Gj+Kk+Ol, Cm+Gn+Ko+Op)
   (Da+Hb+Lc+Pd, De+Hf+Lg+Ph, Di+Hj+Lk+Pl, Dm+Hn+Lo+Pp)
```

Table 3 - Matrix Combination

Perspective

Finally, there is a third approach we can adopt to the study of three dimensional graphics. Instead of moving tanks and jets around the screen, we can generate symmetrical objects such as wine glasses, by rotating a shaped line through 360 degrees. RUN Listing Four and the computer will generate a perspective view of a wine glass. When prompted for rotation angles, enter values between minus three and plus three. The program works by reading the line co-ordinates into an array. These are then rotated through 360 degrees around the Y-axis, in 23 steps. The program keeps track of the current line, and the last line, in the arrays *"OLD(X, 1-3)"* and *"ROTATED(X, 1-3)"*. The three dimensional co-ordinates of the new line are used to calculate the screen co-ordinates for the perspective view, which are stored at *ROTATED(X, 4&5)*. The program then joins each of the *OLD(−)* and *ROTATED(−)* co-ordinate pairs with a line, and draws in the new *ROTATED* line. Then the *ROTATED(−)* data is transferred to the *OLD(−)* array, and the next line is calculated.

It is possible to change the perspective calculations to include scaling or to put a loop into the program to spin the glass about the X-axis or the Z-axis. Any such alterations must be made to the perspective calculations only (Lines 410-450). The rotation calculations (Lines 480-500) must not be changed, or the glass shape will be destroyed. The object shape can be changed by altering the data statement in Line 520. As with all the programs, this data statement must be terminated by a 999 to indicate the end of the co-ordinate data. The only problem we are left with, is the "Necker Cube" type of illusion. There are times when it is not possible to tell whether the glass is pointing towards us, or away from us. Although there are some visual clues from the relative sizes of the near and distant parts of the glass, the eyes are often fooled. This is a problem common to all symmetrical wire frame models, and can only be solved by the use of "hidden line removal" techniques. These I leave for you to work on.

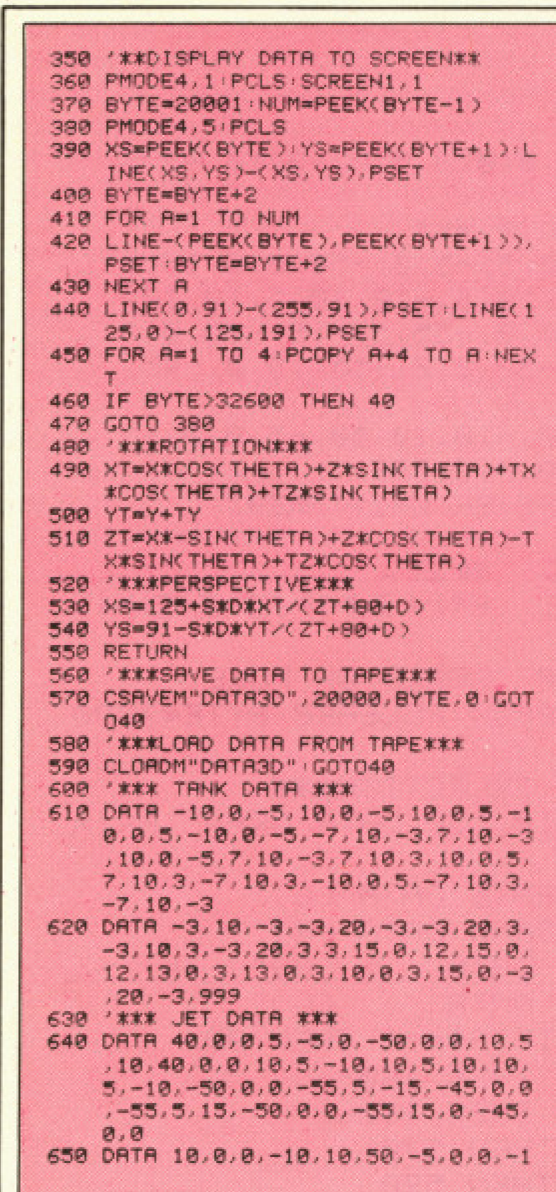
LISTING #1. 3D ROTATION.

```
10 POKE65495,0:'***SPEED UP POKE***

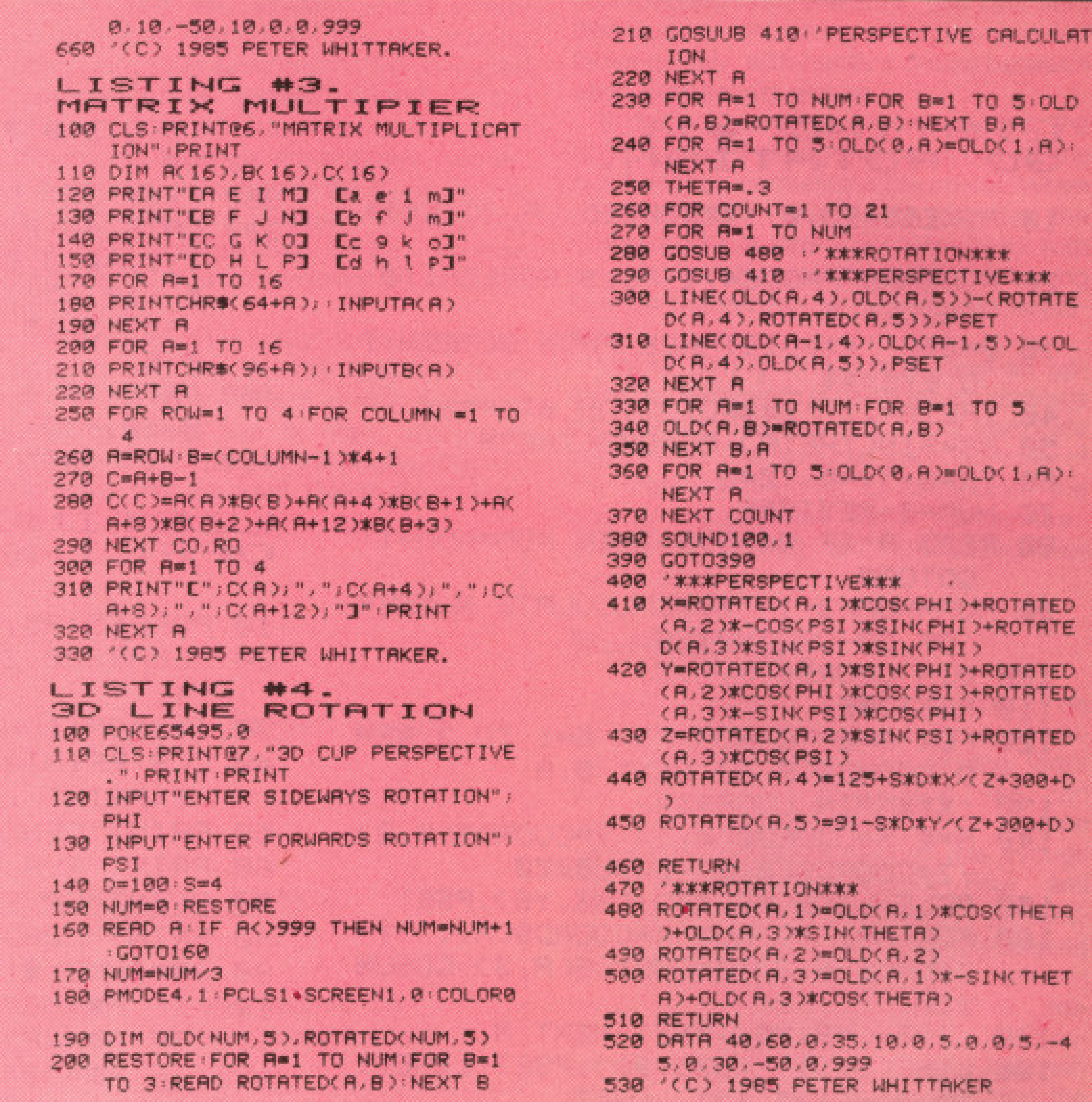
20 PCLEAR8:PMODE4,1:PCLS:SCREEN1,0:
    PMODE4,5
30 D=200:'***DISTANCE FROM SCREEN T
    O EYE***
40 THETA=.1:'***ROTATION STEP***
50 SS=SIN(THETA):CC=COS(THETA)
60 TX=0:TY=0:TZ=0
70 NUM=0:RESTORE
80 READ A:IF A<>999 THEN NUM=NUM+1:
    GOTO80
90 NUM=NUM/3-1:'***CALCULATE NUMBER
     OF CO-ORDINATES
100 DIM COORDS(NUM,3)
110 RESTORE
120 FOR A=0 TO NUM:FOR B=1 TO 3:REA
    D COORDS(A,B):NEXT B,A
130 '***MAIN LOOP***
140 A=0:X=COORDS(0,1):Y=COORDS(0,2)
    :Z=COORDS(0,3):GOSUB220
150 PCLS:LINE(XS,YS)-(XS,YS),PSET
160 FOR A=1 TO NUM:X=COORDS(A,1):Y=
    COORDS(A,2):Z=COORDS(A,3):GOSUB
    220
170 LINE-(XS,YS),PSET:NEXT A
180 LINE(0,91)-(255,91),PSET:LINE(1
    25,0)-(125,191),PSET
190 FOR A=1 TO 4:PCOPY A+4 TO A:NEX
    T A
200 GOTO140
210 '***TRANSLATION***
220 XT=X
230 YT=Y*CC-Z*SS+TY*CC-TZ*SS-TY
240 ZT=Y*SS+Z*CC+TY*SS+TZ*CC-TZ
250 COORDS(A,1)=XT:COORDS(A,2)=YT:C
    OORDS(A,3)=ZT
2600 '***PERSPECTIVE***
270 S=2:'***SCALE OF DRAWING***
280 XS=S*XT*D/(ZT+40+D)+125
290 YS=-S*YT*D/(ZT+40+D)+91
300 RETURN
310 '*** PYRAMID DATA ***
320 DATA -10,-10,-10,-10,-10,10,10,
    -10,10,10,-10,-10,-10,-10,-10,0
    ,20,0,10,-10,10,10,-10,-10,0,20
    ,0,-10,-10,10,999
330 '*** SECOND PYRAMID***
340 DATA 10,10,10,10,10,30,30,10,30
    ,30,10,10,10,10,10,20,20,40,30,
    10,30,10,10,30,20,20,40,30,10,1
    0,999
350 '*** TANK DATA ***
360 DATA -10,-10,-5,10,-10,-5,10,-1
    0,5,-10,-10,5,-10,-10,-5,-7,0,-
    3,7,0,-3,10,-10,-5,7,0,-3,7,0,3
    ,10,-10,5,7,0,3,-7,0,3,-10,-10,
    5,-7,0,3,-7,0,-3
370 DATA -3,0,-3,-3,10,-3,-3,10,3,-
    3,0,3,-3,10,3,3,5,0,12,5,0,12,3
    ,0,3,3,0,3,0,0,3,5,0,-3,10,-3,9
    99
380 '*** JET DATA ***
390 DATA 40,0,0,5,-5,0,-50,0,0,10,5
    ,10,40,0,0,10,5,-10,10,5,10,10,
    5,-10,-50,0,0,-55,5,-15,-45,0,0
    ,-55,5,15,-50,0,0,-55,15,0,-45,
    0,0
400 DATA 10,0,0,-10,10,50,-5,0,0,-1
    0,10,-50,10,0,0,999
410 '(C) 1985 PETER WHITTAKER.
```

LISTING #2. OFFLINE ANIMATION

```
10 POKE65495,0:'SPEED UP POKE
20 CLEAR200,20000:PCLEAR8:BYTE=2000
    1
30 '***OPTION SELECTION***
40 CLS:PRINT@10,"3D DATA DRAW":PRIN
    T:PRINT
50 PRINT"GENERATE DATA (G)"
60 PRINT"RUN DRAW DATA (R)"
70 PRINT"SAVE DATA      (S)"
80 PRINT"LOAD DATA      (L)"
90 A$=INKEY$:IF A$="" THEN 90
100 IF A$="G" THEN 160
110 IF A$="R" THEN 360
120 IF A$="S"THEN 570
130 IF A$="L"THEN 590
140 GOTO90
150 '***CALCULATE NUMBER OF POINTS*
    **
160 RESTORE:NUM=0
170 READ A:IF A<>999 THEN NUM=NUM+1
    :GOTO170
180 NUM=NUM/3-1
190 POKEBYTE-1,NUM:'SAVE NUM IN COD
    E
200 '***CALCULATE CO-ORDINATES***
210 D=100:S=2:'DISTANCE OF EYE FROM
     SCREEN, AND SCALING FACTOR FOR
     DISPLAY.
220 TX=0:TY=50:TZ=80
230 THETA=THETA+.1:'ROTATION STEP
240 IF TY>49 THEN VERTICAL=-1ELSE I
    F TY<-50 THEN VERTICAL=1
250 TY=TY+VERTICAL
260 RESTORE
270 READ X,Y,Z:GOSUB490
280 POKEBYTE,XS:POKEBYTE+1,YS:BYTE=
    BYTE+2
290 FOR A=1 TO NUM:READ X,Y,Z
300 GOSUB490
310 POKE BYTE,XS:POKEBYTE++1,YS:BYTE
    =BYTE+2
320 PRINTBYTE:IF BYTE>32600 THEN GO
    TO40
330 NEXT A
340 GOTO230
```



```
350 '**DISPLAY DATA TO SCREEN**
360 PMODE4,1:PCLS:SCREEN1,1
370 BYTE=20001:NUM=PEEK(BYTE-1)
380 PMODE4,5:PCLS
390 XS=PEEK(BYTE):YS=PEEK(BYTE+1):L
    INE(XS,YS)-(XS,YS),PSET
400 BYTE=BYTE+2
410 FOR A=1 TO NUM
420 LINE-(PEEK(BYTE),PEEK(BYTE+1)),
    PSET:BYTE=BYTE+2
430 NEXT A
440 LINE(0,91)-(255,91),PSET:LINE(1
    25,0)-(125,191),PSET
450 FOR A=1 TO 4:PCOPY A+4 TO A:NEX
    T
460 IF BYTE>32600 THEN 40
470 GOTO 380
480 '***ROTATION***
490 XT=X*COS(THETA)+Z*SIN(THETA)+TX
    *COS(THETA)+TZ*SIN(THETA)
500 YT=Y+TY
510 ZT=X*-SIN(THETA)+Z*COS(THETA)-T
    X*SIN(THETA)+TZ*COS(THETA)
520 '***PERSPECTIVE***
530 XS=125+S*D*XT/(ZT+80+D)
540 YS=91-S*D*YT/(ZT+80+D)
550 RETURN
560 '***SAVE DATA TO TAPE***
570 CSAVEM"DATA3D",20000,BYTE,0:GOT
    040
580 '***LOAD DATA FROM TAPE***
590 CLOADM"DATA3D":GOTO40
600 '*** TANK DATA ***
610 DATA -10,0,-5,10,0,-5,10,0,5,-1
    0,0,5,-10,0,-5,-7,10,-3,7,10,-3
    ,10,0,-5,7,10,-3,7,10,3,10,0,5,
    7,10,3,-7,10,3,-10,0,5,-7,10,3,
    -7,10,-3
620 DATA -3,10,-3,-3,20,-3,-3,20,3,
    -3,10,3,-3,20,3,3,15,0,12,15,0,
    12,13,0,3,13,0,3,10,0,3,15,0,-3
    ,20,-3,999
630 '*** JET DATA ***
640 DATA 40,0,0,5,-5,0,-50,0,0,10,5
    ,10,40,0,0,10,5,-10,10,5,10,10,
    5,-10,-50,0,0,-55,5,-15,-45,0,0
    ,-55,5,15,-50,0,0,-55,15,0,-45,
    0,0
650 DATA 10,0,0,-10,10,50,-5,0,0,-1
```



```
    0,10,-50,10,0,0,999
660 '(C) 1985 PETER WHITTAKER.
```

LISTING #3.
MATRIX MULTIPIER

```
100 CLS:PRINT@6,"MATRIX MULTIPLICAT
    ION":PRINT
110 DIM A(16),B(16),C(16)
120 PRINT"[A E I M]  [a e i m]"
130 PRINT"[B F J N]  [b f j m]"
140 PRINT"[C G K O]  [c g k o]"
150 PRINT"[D H L P]  [d h l p]"
170 FOR A=1 TO 16
180 PRINTCHR$(64+A);:INPUTA(A)
190 NEXT A
200 FOR A=1 TO 16
210 PRINTCHR$(96+A);:INPUTB(A)
220 NEXT A
250 FOR ROW=1 TO 4:FOR COLUMN =1 TO
     4
260 A=ROW:B=(COLUMN-1)*4+1
270 C=A+B-1
280 C(C)=A(A)*B(B)+A(A+4)*B(B+1)+A(
    A+8)*B(B+2)+A(A+12)*B(B+3)
290 NEXT CO,RO
300 FOR A=1 TO 4
310 PRINT"[";C(A);",";C(A+4);",";C(
    A+8);",";C(A+12);"]":PRINT
320 NEXT A
330 '(C) 1985 PETER WHITTAKER.
```

LISTING #4.
3D LINE ROTATION

```
100 POKE65495,0
110 CLS:PRINT@7,"3D CUP PERSPECTIVE
    .":PRINT:PRINT
120 INPUT"ENTER SIDEWAYS ROTATION";
    PHI
130 INPUT"ENTER FORWARDS ROTATION";
    PSI
140 D=100:S=4
150 NUM=0:RESTORE
160 READ A:IF A<>999 THEN NUM=NUM+1
    :GOTO160
170 NUM=NUM/3
180 PMODE4,1:PCLS1:SCREEN1,0:COLOR0

190 DIM OLD(NUM,5),ROTATED(NUM,5)
200 RESTORE:FOR A=1 TO NUM:FOR B=1
    TO 3:READ ROTATED(A,B):NEXT B
210 GOSUUB 410:'PERSPECTIVE CALCULAT
    ION
220 NEXT A
230 FOR A=1 TO NUM:FOR B=1 TO 5:OLD
    (A,B)=ROTATED(A,B):NEXT B,A
240 FOR A=1 TO 5:OLD(0,A)=OLD(1,A):
    NEXT A
250 THETA=.3
260 FOR COUNT=1 TO 21
270 FOR A=1 TO NUM
280 GOSUB 480 :'***ROTATION***
290 GOSUB 410 :'***PERSPECTIVE***
300 LINE(OLD(A,4),OLD(A,5))-(ROTATE
    D(A,4),ROTATED(A,5)),PSET
310 LINE(OLD(A-1,4),OLD(A-1,5))-(OL
    D(A,4),OLD(A,5)),PSET
320 NEXT A
330 FOR A=1 TO NUM:FOR B=1 TO 5
340 OLD(A,B)=ROTATED(A,B)
350 NEXT B,A
360 FOR A=1 TO 5:OLD(0,A)=OLD(1,A):
    NEXT A
370 NEXT COUNT
380 SOUND100,1
390 GOTO390
400 '***PERSPECTIVE***
410 X=ROTATED(A,1)*COS(PHI)+ROTATED
    (A,2)*-COS(PSI)*SIN(PHI)+ROTATE
    D(A,3)*SIN(PSI)*SIN(PHI)
420 Y=ROTATED(A,1)*SIN(PHI)+ROTATED
    (A,2)*COS(PHI)*COS(PSI)+ROTATED
    (A,3)*-SIN(PSI)*COS(PHI)
430 Z=ROTATED(A,2)*SIN(PSI)+ROTATED
    (A,3)*COS(PSI)
440 ROTATED(A,4)=125+S*D*X/(Z+300+D
    )
450 ROTATED(A,5)=91-S*D*Y/(Z+300+D)

460 RETURN
470 '***ROTATION***
480 ROTATED(A,1)=OLD(A,1)*COS(THETA
    )+OLD(A,3)*SIN(THETA)
490 ROTATED(A,2)=OLD(A,2)
500 ROTATED(A,3)=OLD(A,1)*-SIN(THET
    A)+OLD(A,3)*COS(THETA)
510 RETURN
520 DATA 40,60,0,35,10,0,5,0,0,5,-4
    5,0,30,-50,0,999
530 '(C) 1985 PETER WHITTAKER
```

Donkey's Tail

An old family favourite brought to you by ***Brian Hinson***

NOW THAT the extremely late summer has been forced to depart and we are all huddled round our computers with our loved ones, I thought it was about time we had a really easy game that everyone can play. (Well anyone who can use a joystick.)

Grandad and the toddlers should be able to manage this one. But it will take you a bit of work to get it ready, especially if you want it to be attractive to visitors around for those dark February evenings.

You will need a drawing in PMODE 3 of a donkey, some form of instructions and the main listing. Now there are several ways of achieving this:

1) I have provided full listings here that will allow you to set everything up as I have designed it.

2) If you have "Artist", as published in *Dragon User* in April 1985, you will be able to produce your own machine code program from a donkey you draw yourself.

3) If you have "Zippy", as published in *Dragon User* in October 1985 you can produce your own title pages.

4) You may have another means of producing the donkey and/or title pages.

From now on I will assume you are using my listing, but will add notes as appropriate for those who are not. When all the listings are completed and recorded on to tape in the right order the following will happen: type CLOAD and the "START" program will load. Type RUN and a few bars of the "Donkey serenade" will play followed by the display of the first title page whilst the "DONKEY" graphics are loaded. The second title page will be displayed whilst the main program loads. Type RUN when the "OK" prompt appears.

This will display a Donkey standing in a field of green. The animal moves to a random position where it is seen for only a moment. You are then given a tail coloured red, yellow or blue, which you move using the right joystick, to where you think the Donkey's bottom is. Press the button and see how close you are! The Donkey re-appears with the new tail. Pass the joystick to the next player and press 'R' for a new tail of the next colour. The blank green screen is displayed with the new tail to be positioned.

When you want the Donkey to find a new place to hide press the Spacebar. All screens are cleared and you start all over again with the Donkey appearing in a new random position.

But that's all in the future — for the present let's get down to business. first you need to type in the "Star" program listing and save it near the beginning of a blank tape.

Next you need an introductory title page. I offer you Listing 1 which will create and save a machine code program to display basic information on the text screen whilst your donkey graphics load.

Now you will need a Donkey! If you like you can draw your own donkey in the rectangle defined by (0,66) – (114,170). If you are using "ARTIST" load the program as normal but before running it edit the CSAVE part to read: **1010** .... CSAVEM "DONKEY", 1536,7679,1536

RUN and set up the PMODE 3,1 SCREEN 1,0 with a green background. Before you actually start to draw press BREAK and put in the following direct command: *LINE (0,66)–(114,170), PSET, B:SCREEN1.0:CONT.* You will now be able to see exactly where your Donkey must be drawn. (Face the donkey to the left.) When ready put the tape in your recorder and proceed with the "SAVE" routine.

Alternatively you can use the Graphics listing to create a machine code program and save it after the first title page. The program given provides, in Line 210, a means of checking all the programs on the tape so far by including SKIPF. If all is OK the Donkey picture is saved.

Now all that remains is to type in and save the main program. Note that this must be saved with the name "PINTAIL" so that it will be automatically loaded by the START program.

Reqind the tape, plug in the right joystick, type CLOAD and when the "OK" prompt appears type RUN. Sit back and watch the screens change as the programs load. Again type RUN when the "OK" prompt appears and see how close you can get that tail to its correct location. No cheating is allowed and any arguments about where the tail should be will be settled by Mum!

```
START_

10 CLS0 : GOSUB 400
20 CLOADM "NED"
40 CLEAR500
50 PCLEAR8
60 DIM H(400),T1(10),T2(10)
70 C=4
80 PMODE3,1 : PCLS
90 CLOADM "DONKEY"
99 CLOADM "NED2" : GOSUB 400
100 CLOAD "PINTAIL"
400 'music sub
410 FOR A=1 TO 8
420 READ A$ : PLAY A$
430 NEXT A
450 RETURN
500 DATA T5O3EFL3GP6,L4DEGP6,L4DEGP6
510 DATA O4L3CO3L4AGE,O3L7DCDEL3GP6
520 DATA O3L3DEL3.GL3DEL2CP4
530 DATA O4L6CCCCL6DL5O3G
540 DATA O3L4AO4CL6DEFED
```

```
10 CLS
20 FOR A=1024 TO 1535
30 READ B : POKE A,B
40 NEXT A
45 MOTOR ON
50 SOUND 250,1 : K$=INKEY$
60 IF K$="" THEN 50
65 MOTOR OFF
70 CSAVEM "NED",1024,1535,1024
80 END
1000 DATA  156, 156, 156, 156, 156
1010 DATA  156, 156, 156, 156, 156
1020 DATA  156, 4, 15, 14, 11
1030 DATA  5, 25, 156, 156, 156
1040 DATA  156, 156, 156, 156, 156
1050 DATA  156, 156, 156, 156, 156
1060 DATA  156, 156, 239, 239, 239
1070 DATA  239, 239, 239, 239, 239
1080 DATA  239, 239, 239, 239, 239
1090 DATA  239, 239, 239, 239, 239
1100 DATA  239, 239, 239, 239, 239
1110 DATA  239, 239, 239, 239, 239
1120 DATA  239, 239, 239, 239, 13
1130 DATA  25, 239, 4, 15, 14
1140 DATA  11, 5, 25, 239, 14
1150 DATA  5, 4, 239, 8, 1
1160 DATA  19, 239, 12, 15, 19
1170 DATA  20, 239, 8, 9, 19
1180 DATA  239, 20, 1, 9, 12
1190 DATA  33, 239, 239, 239, 239
1200 DATA  239, 239, 239, 239, 239
1210 DATA  239, 239, 239, 239, 239
1220 DATA  239, 239, 239, 239, 239
1230 DATA  239, 239, 239, 239, 239
1240 DATA  239, 239, 239, 239, 239
1250 DATA  239, 239, 239, 239, 16
1260 DATA  12, 5, 1, 19, 5
1270 DATA  239, 23, 9, 12, 12
1280 DATA  239, 25, 15, 21, 239
1290 DATA  8, 5, 12, 16, 239
1300 DATA  18, 5, 6, 9, 24
1310 DATA  239, 9, 20, 63, 239
1320 DATA  239, 239, 239, 239, 239
1330 DATA  239, 239, 239, 239, 239
1340 DATA  239, 239, 239, 239, 239
1350 DATA  239, 239, 239, 239, 239
1360 DATA  239, 239, 239, 239, 239
1370 DATA  239, 239, 239, 239, 239
1380 DATA  239, 239, 236, 236, 236
1390 DATA  236, 236, 236, 236, 236
1400 DATA  236, 236, 236, 236, 236
1410 DATA  236, 236, 236, 236, 236
1420 DATA  236, 236, 236, 236, 236
1430 DATA  236, 236, 236, 236, 236
1440 DATA  236, 236, 236, 236, 252
1450 DATA  252, 252, 252, 252, 252
1460 DATA  252, 252, 252, 252, 252
1470 DATA  252, 252, 252, 252, 252
1480 DATA  252, 252, 252, 252, 252
1490 DATA  252, 252, 252, 252, 252
1500 DATA  252, 252, 252, 252, 252
1510 DATA  252, 255, 255, 255, 255
1520 DATA  255, 255, 255, 255, 255
1530 DATA  255, 255, 255, 255, 255
1540 DATA  255, 255, 255, 255, 255
1550 DATA  255, 255, 255, 255, 255
1560 DATA  255, 255, 255, 255, 255
1570 DATA  255, 255, 255, 255, 19
1580 DATA  15, 15, 14, 255, 25
1590 DATA  15, 21, 255, 23, 9
1600 DATA  12, 12, 255, 19, 5
1610 DATA  5, 255, 8, 9, 13
1620 DATA  255, 19, 20, 1, 14
1630 DATA  4, 9, 14, 7, 255
1640 DATA  255, 255, 255, 255, 255
1650 DATA  255, 255, 255, 255, 255
1660 DATA  255, 255, 255, 255, 255
1670 DATA  255, 255, 255, 255, 255
1680 DATA  255, 255, 255, 255, 255
1690 DATA  255, 255, 255, 255, 255
1700 DATA  255, 255, 9, 14, 255
1710 DATA  8, 9, 19, 255, 6
1720 DATA  9, 5, 12, 4, 46
1730 DATA  255, 8, 5, 255, 23
1740 DATA  9, 12, 12, 255, 8
1750 DATA  9, 4, 5, 46, 255
1760 DATA  20, 18, 25, 255, 255
1770 DATA  255, 255, 255, 255, 255
1780 DATA  255, 255, 255, 255, 255
1790 DATA  255, 255, 255, 255, 255
1800 DATA  255, 255, 255, 255, 255
1810 DATA  255, 255, 255, 255, 255
1820 DATA  255, 255, 255, 255, 255
1830 DATA  255, 20, 15, 255, 18
1840 DATA  5, 13, 5, 13, 2
1850 DATA  5, 18, 255, 23, 8
1860 DATA  5, 18, 5, 255, 8
1870 DATA  5, 255, 9, 19, 255
1880 DATA  1, 14, 4, 255, 13
1890 DATA  15, 22, 5, 239, 239
1900 DATA  239, 239, 239, 239, 239
1910 DATA  239, 239, 239, 239, 239
1920 DATA  239, 239, 239, 239, 239
1930 DATA  239, 239, 239, 239, 239
1940 DATA  239, 239, 239, 239, 239
1950 DATA  239, 239, 239, 239, 239
1960 DATA  8, 9, 19, 239, 20
1970 DATA  1, 9, 12, 239, 21
1980 DATA  19, 9, 14, 7, 239
1990 DATA  20, 8, 5, 239, 10
2000 DATA  15, 25, 19, 20, 9
2010 DATA  3, 11, 46, 239, 239
2020 DATA  239, 239, 0, 0, 0
```

Listing 1 — Creates first title page

```
10 PCLEAR 4 : PMODE3,1
20 PCLS : SCREEN 1,0
30 FOR A=0 TO 636
40 READ B,C
50 POKE B,C
60 NEXT A
70 FOR B=1 TO 20
80 Y=RND(150)+30
90 X=RND(100)+140
100 IF Y<60 THEN X=X-120
110 FOR A=1 TO 3+RND(6)
120 COLOR RND(3)+1,1
130 IF Y<100 THEN Y2=0
140 C=RND(20)-10
150 IF Y>100 AND Y<120 THEN Y2=2
160 IF Y>120 AND Y<140 THEN Y2=4
170 IF Y>139 AND Y<180 THEN Y2=6
180 LINE(X,Y)-(X+C,Y-Y2-3),PSET
190 NEXT A,B
200 CLS : PRINT"SET YOUR TAPE UP TO <PLAY> WITH YOUR <DONKEY>
TAPE ALREADY       CONTAINING 'NED' "
210 SKIPF"NED"
220 CLS2 : PRINT"NOW SET THE RECORDER TO <RECORD>":PRINT"PRESS
<R> WHEN READY"
230 K$=INKEY$: IF K$<>"R" THEN 230
240 CSAVEM"DONKEY",1536,7679,1536
250 END
1000 DATA 3714;3,3715,192,3746,3,3747,240,3778,3,3779,112,3810
          ,3,3811,112,3842,3,3843,112,3874,3,3875,112,3906,15,
          3907,112,3938,63,3939,127,3970,255,3971,124,3972,192

1010 DATA 4002,213,4003,95,4004,192,4034,213,4035,87,4036,192,
          4065,3,4066,223,4067,87,4068,192,4097,3,4098,95,4099
          ,215,4100,240,4129,15,4130,95,4131,87,4132,240,4161,
          13,4162,87

1020 DATA 4163,87,4164,252,4193,61,4194,85,4195,85,4196,252,42
          25,53,4226,85,4227,85,4228,95,4257,245,4258,85,4259,
          85,4260,95,4261,192,4289,245,4290,85,4291,85,4292,95
          ,4293,192

1030 DATA 4320,3,4321,253,4322,85,4323,85,4324,87,4325,192,435
          2,15,4353,93,4354,85,4355,245,4356,87,4357,192,4384,
          13,4385,95,4386,95,4387,213,4388,87,4389,255,4416,63
          ,4417,87

1040 DATA 4418,253,4419,85,4420,87,4421,255,4422,240,4448,63,4
          449,87,4450,85,4451,85,4452,85,4453,252,4454,48,4480
          ,63,4481,87,4482,85,4483,85,4484,85,4485,95,4486,60,
          4512,15

1050 DATA 4513,87,4514,213,4515,85,4516,85,4517,87,4518,255,45
          44,3,4545,85,4546,213,4547,87,4548,213,4549,85,4550,
          255,4551,252,4553,3,4554,252,4576,3,4577,253,4578,21
          3,4579,85
1060 DATA 4580,213,4581,95,4582,245,4583,95,4584,252,4585,63,4
          586,95,4587,192,4609,213,4610,253,4611,85,4612,213,4
          613,95,4614,245,4615,85,4616,95,4617,245,4618,85,461
          9,240,4640,3
```

Graphics Listing

```
1070 DATA 4641,211,4642,255,4643,213,4644,245,4645,95,4646,85,
          4647,85,4648,85,4649,117,4650,85,4651,124,4673,211,4
          674,192,4675,245,4676,125,4677,95,4678,85,4679,85,46
          80,85,4681,117

1080 DATA 4682,85,4683,95,4705,252,4707,61,4708,93,4709,95,471
          0,85,4711,85,4712,85,4713,125,4714,85,4715,87,4716,1
          92,4739,13,4740,95,4741,85,4742,85,4743,85,4744,85,4
          745,93

1090 DATA 4746,85,4747,85,4748,192,4771,15,4772,87,4773,85,477
          4,85,4775,85,4776,85,4777,95,4778,85,4779,85,4780,24
          0,4803,3,4804,87,4805,85,4806,85,4807,85,4808,85,480
          9,87

1100 DATA 4810,85,4811,85,4812,112,4835,3,4836,87,4837,85,4838
          ,85,4839,85,4840,85,4841,85,4842,85,4843,85,4844,112
          ,4867,3,4868,87,4869,85,4870,85,4871,85,4872,85,4873
          ,85

1110 DATA 4874,85,4875,85,4876,92,4899,3,4900,87,4901,85,4902,
          85,4903,85,4904,85,4905,85,4906,85,4907,85,4908,92,4
          931,3,4932,85,4933,85,4934,85,4935,85,4936,85,4937,8
          5

1120 DATA 4938,85,4939,85,4940,92,4963,3,4964,213,4965,85,4966
          ,85,4967,85,4968,85,4969,85,4970,85,4971,85,4972,92,
          4996,213,4997,85,4998,85,4999,85,5000,85,5001,85,500
          2,85

1130 DATA 5003,85,5004,95,5028,213,5029,85,5030,85,5031,85,503
          2,85,5033,85,5034,85,5035,85,5036,87,5060,213,5061,8
          5,5062,87,5063,85,5064,85,5065,85,5066,85,5067,85,50
          68,87

1140 DATA 5092,245,5093,85,5094,95,5095,85,5096,85,5097,85,509
          8,85,5099,85,5100,87,5124,245,5125,85,5126,93,5127,8
          5,5128,85,5129,85,5130,85,5131,85,5132,87,5156,63,51
          57,85

1150 DATA 5158,93,5159,85,5160,85,5161,255,5162,85,5163,85,516
          4,87,5188,53,5189,85,5190,93,5191,85,5192,85,5193,85
          ,5194,85,5195,85,5196,87,5220,63,5221,85,5222,93,522
          3,85

1160 DATA 5224,95,5225,253,5226,213,5227,85,5228,87,5252,55,52
          53,85,5254,95,5255,213,5256,85,5257,85,5258,213,5259
          ,85,5260,87,5284,51,5285,213,5286,126,5287,245,5288,
          127,5289,255
1170 DATA 5290,213,5291,85,5292,87,5316,53,5317,213,5318,122,5
          319,181,5320,85,5321,255,5322,213,5323,85,5324,87,53
          48,13,5349,213,5350,122,5351,189,5352,85,5353,255,53
          54,245,5355,85

1180 DATA 5356,87,5380,13,5381,245,5382,122,5383,173,5384,95,5
          385,192,5386,245,5387,85,5388,87,5412,13,5413,117,54
          14,122,5415,175,5416,255,5417,255,5418,245,5419,85,5
          420,95,5444,3
```

Graphics Listing — cont

```
1190 DATA 5445,117,5446,126,5447,171,5448,234,5449,170,5450,24
          5,5451,85,5452,92,5476,3,5477,117,5478,94,5479,170,5
          480,234,5481,170,5482,245,5483,85,5484,124,5508,3,55
          09,245,5510,94

1200 DATA 5511,170,5512,170,5513,170,5514,253,5515,85,5516,112
          ,5541,53,5542,94,5543,170,5544,170,5545,170,5546,189
          ,5547,85,5548,112,5573,53,5574,126,5575,170,5576,170
          ,5577,190,5578,191

1210 DATA 5579,213,5580,112,5605,53,5606,115,5607,235,5608,251
          ,5609,255,5610,191,5611,213,5612,112,5637,53,5638,11
          5,5639,255,5640,63,5641,3,5642,170,5643,213,5644,112
          ,5669,53,5670,115

1220 DATA 5673,3,5674,234,5675,245,5676,112,5701,53,5702,127,5
          706,255,5707,245,5708,124,5733,61,5734,95,5738,235,5
          739,245,5740,92,5765,13,5766,95,5770,43,5771,245,577
          2,92,5797,13

1230 DATA 5798,92,5802,10,5803,245,5804,92,5829,13,5830,95,583
          4,10,5835,253,5836,92,5861,13,5862,87,5866,15,5867,2
          53,5868,92,5893,15,5894,215,5898,3,5899,61,5900,95,5
          926,215

1240 DATA 5931,253,5932,87,5958,215,5963,255,5964,87,5990,215,
          5995,255,5996,87,6022,215,6027,63,6028,87,6054,215,6
          059,63,6060,87,6061,192,6086,215,6091,63,6092,85,609
          3,240,6118,215

1250 DATA 6119,192,6123,15,6124,213,6125,112,6150,215,6151,192
          ,6155,15,6156,213,6157,112,6182,223,6183,192,6187,15
          ,6188,213,6189,112,6213,3,6214,223,6215,192,6219,15,
          6220,213,6221,112

1260 DATA 6245,3,6246,95,6247,192,6251,12,6252,213,6253,112,62
          77,3,6278,95,6283,15,6284,247,6285,240,6309,3,6310,1
          27,6315,3,6316,247,6317,192,6341,3,6342,127,6347,3,6
          348,247

1270 DATA 6349,192,6373,3,6374,127,6379,3,6380,247,6381,192,64
          05,15,6406,127,6411,3,6412,247,6413,192,6437,13,6438
          ,127,6443,3,6444,247,6445,192,6469,13,6470,112,6475,
          15,6476,247
1280 DATA 6477,192,6501,13,6502,112,6507,15,6508,247,6509,192,
          6533,13,6534,112,6539,63,6540,53,6541,192,6565,61,65
          66,240,6571,63,6572,245,6573,192,6597,53,6598,192,66
          03,60,6604,245

1290 DATA 6605,192,6629,255,6630,192,6632,15,6633,255,6634,207
          ,6635,255,6636,213,6637,192,6661,255,6662,192,6664,3
          ,6668,215,6669,192,6692,3,6693,255,6694,192,6695,3,6
          696,255,6697,255

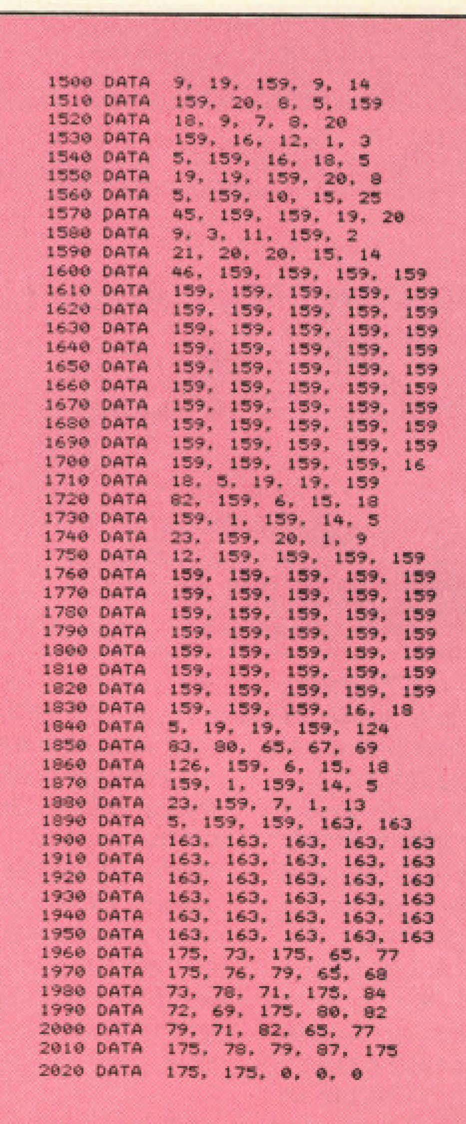
1300 DATA 6698,195,6699,240,6700,215,6724,3,6725,255,6726,192,
          6731,3,6732,223,6754,3,6755,255,6756,255,6757,255,67
          58,255,6759,195,6760,255,6761,255,6762,240,6763,255,
          6764,255,6765,255

1310 DATA 6795,3,6796,252,6819,3,6820,255,6821,255,6822,255,68
          23,207,6824,255,6825,255,6826,255,6827,255,6828,255,
          6829,255,6830,240,6859,15,6860,255,6861,255,6862,255
```

Graphics Listing — cont

```
70 CSAVEM "NED2",1024,1535,1024

1000 DATA 195, 195, 223, 223, 223
1010 DATA 223, 223, 223, 223, 223
1020 DATA 223, 223, 223, 223, 223
1030 DATA 223, 223, 195, 195, 195
1040 DATA 195, 195, 195, 195, 195
1050 DATA 195, 195, 195, 195, 195
1060 DATA 195, 195, 207, 207, 223
1070 DATA 192, 221, 223, 192, 223
1080 DATA 192, 211, 211, 223, 192
1090 DATA 211, 212, 223, 223, 20
1100 DATA 8, 5, 192, 4, 15
1110 DATA 14, 11, 5, 25, 192
1120 DATA 207, 207, 207, 207, 207
1130 DATA 207, 223, 192, 219, 221
1140 DATA 192, 223, 192, 221, 223
1150 DATA 223, 192, 223, 218, 213
1160 DATA 223, 207, 207, 207, 207
1170 DATA 207, 207, 207, 207, 207
1180 DATA 207, 207, 207, 207, 207
1190 DATA 207, 255, 255, 239, 192
1200 DATA 239, 235, 192, 239, 192
1210 DATA 236, 236, 239, 192, 236
1220 DATA 225, 239, 239, 255, 255
1230 DATA 255, 255, 255, 255, 255
1240 DATA 255, 255, 255, 255, 255
1250 DATA 255, 255, 255, 204, 204
1260 DATA 204, 204, 204, 204, 204
1270 DATA 204, 204, 204, 204, 204
1280 DATA 204, 204, 204, 204, 2
1290 DATA 25, 204, 66, 82, 73
1300 DATA 65, 78, 204, 72, 73
1310 DATA 78, 83, 79, 78, 204
1320 DATA 159, 159, 159, 159, 159
1330 DATA 159, 159, 159, 159, 159
1340 DATA 159, 159, 159, 159, 159
1350 DATA 159, 159, 159, 159, 159
1360 DATA 159, 159, 159, 159, 159
1370 DATA 159, 159, 159, 49, 57
1380 DATA 56, 53, 169, 169, 169
1390 DATA 169, 169, 169, 169, 169
1400 DATA 169, 169, 169, 169, 169
1410 DATA 169, 169, 169, 169, 169
1420 DATA 169, 169, 169, 169, 169
1430 DATA 169, 169, 169, 169, 169
1440 DATA 169, 169, 169, 169, 159
1450 DATA 159, 23, 8, 5, 14
1460 DATA 159, 25, 15, 21, 159
1470 DATA 20, 8, 9, 14, 11
1480 DATA 159, 20, 8, 5, 159
1490 DATA 20, 1, 9, 12, 159
```



```
1500 DATA 9, 19, 159, 9, 14
1510 DATA 159, 20, 8, 5, 159
1520 DATA 18, 9, 7, 8, 20
1530 DATA 159, 16, 12, 1, 3
1540 DATA 5, 159, 16, 18, 5
1550 DATA 19, 19, 159, 20, 8
1560 DATA 5, 159, 10, 15, 25
1570 DATA 45, 159, 159, 19, 20
1580 DATA 9, 3, 11, 159, 2
1590 DATA 21, 20, 20, 15, 14
1600 DATA 46, 159, 159, 159, 159
1610 DATA 159, 159, 159, 159, 159
1620 DATA 159, 159, 159, 159, 159
1630 DATA 159, 159, 159, 159, 159
1640 DATA 159, 159, 159, 159, 159
1650 DATA 159, 159, 159, 159, 159
1660 DATA 159, 159, 159, 159, 159
1670 DATA 159, 159, 159, 159, 159
1680 DATA 159, 159, 159, 159, 159
1690 DATA 159, 159, 159, 159, 159
1700 DATA 159, 159, 159, 159, 16
1710 DATA 18, 5, 19, 19, 159
1720 DATA 82, 159, 6, 15, 18
1730 DATA 159, 1, 159, 14, 5
1740 DATA 23, 159, 20, 1, 9
1750 DATA 12, 159, 159, 159, 159
1760 DATA 159, 159, 159, 159, 159
1770 DATA 159, 159, 159, 159, 159
1780 DATA 159, 159, 159, 159, 159
1790 DATA 159, 159, 159, 159, 159
1800 DATA 159, 159, 159, 159, 159
1810 DATA 159, 159, 159, 159, 159
1820 DATA 159, 159, 159, 159, 159
1830 DATA 159, 159, 159, 16, 18
1840 DATA 5, 19, 19, 159, 124
1850 DATA 83, 80, 65, 67, 69
1860 DATA 126, 159, 6, 15, 18
1870 DATA 159, 1, 159, 14, 5
1880 DATA 23, 159, 7, 1, 13
1890 DATA 5, 159, 159, 163, 163
1900 DATA 163, 163, 163, 163, 163
1910 DATA 163, 163, 163, 163, 163
1920 DATA 163, 163, 163, 163, 163
1930 DATA 163, 163, 163, 163, 163
1940 DATA 163, 163, 163, 163, 163
1950 DATA 163, 163, 163, 163, 163
1960 DATA 175, 73, 175, 65, 77
1970 DATA 175, 76, 79, 65, 68
1980 DATA 73, 78, 71, 175, 84
1990 DATA 72, 69, 175, 80, 82
2000 DATA 79, 71, 82, 65, 77
2010 DATA 175, 78, 79, 87, 175
2020 DATA 175, 175, 0, 0, 0
```

Edit Graphics Listing as above to make second title page

```
10 DIM H(520),T1(10),T2(10)
20 SCREEN1,0
30 GET(0,66)-(114,170),H,G
40 FOR AA=1 TO 2000 : NEXT AA
50 PMODE3,5 : PCLS4
60 GOSUB 1000
70 X=10 : Y=10 : C=4
80 PCLS
90 PMODE3,1 : PCLS
91 X1=RND(110) : Y1=RND(45)
92 PUT(X1,Y1)-(X1+114,Y1+104),H,PSET
100 PMODE3,5 : SCREEN1,0
110 LINE(X-4,Y-4)-(X+20,Y+36),PRESET,BF
120 GOSUB 1400 : GOSUB 1600 : GOTO 110
290 PMODE3,1 : SCREEN1,0
300 GOSUB 1400
310 K$=INKEY$
320 IF K$="" THEN 310
330 C=C+1 : IF C=5 THEN C=2
340 PMODE3,5 : PCLSC : GOSUB 1000
350 PCLS1
360 X=10 : Y=10
370 IF K$=" " THEN 90
380 SCREEN 1,0 : GOTO 120
390 '****************************
400 '****************************
1000 ' SUB TO GET TAIL
1001 GET (0,0)-(10,2),T1,G
1010 GET(10,0)-(12,30),T2,G
1020 RETURN
1400 ' SUB TO PUT TAIL
1401 PUT(X,Y)-(X+10,Y+2),T1,PSET
1410 PUT(X+10,Y)-(X+12,Y+30),T2,PSET
1420 RETURN
1600 'SUB TO MOVE
1610 GOSUB 2000
1620 IF JOYSTK(0)<20 THEN X=X-4 ELSE  IF  JOYSTK(0)>43
THEN X=X+4
1630  IF  JOYSTK(1)<20 THEN Y=Y-4 ELSE IF JOYSTK(1)>43
THEN Y=Y+4
1640 GOSUB 2000
1650 IF X<10 THEN X=10
1660 IF X>240 THEN X=240
1670 IF Y<10 THEN Y=10
1680 IF Y>156 THEN Y=156
1690 GOSUB 2000
1700 RETURN
2000 ' SUB TO CHECK FOR BUTTON
2001 P=PEEK(65280)
2005 IF P=124 OR P=126 OR P=252 OR P=254 THEN 290
2010 RETURN
```

Main Program

New software for review should be sent to *Dragon User*, 12-13 Little Newport Street, London WC2H 7PP.

Lizard!

Program: Shocktrooper.
Supplier: Microdeal, 41 Truro Rd, St Austell, Cornwall, PL2S 5JE.
Price: £8.00.

OKAY, okay, I know people are fed up with hearing me say it, I know you all think that it's favouritism, but Microdeal have produced what is graphically the best game this year. I was given this game at the 6809 show where it was also on display, and at the time had no idea of its superlativeness!!

The same, is very heavily based upon the television disappointment *V*, putting you in the role of a fifth columnist . . . a what? I'll explain.

The plot ran that Visitors from another planet came to earth and acted very nice and friendly whilst their motives were actually very sinister. Soon they managed to turn the whole of Earth upon the scientists — in a mini-series that shrewdly paralleled certain aspects of World War II (hence the title — *V* — the symbol of the resistance).

It turns out that aliens were actually using us for food as they were not pleasant Hollywood people but lizards.

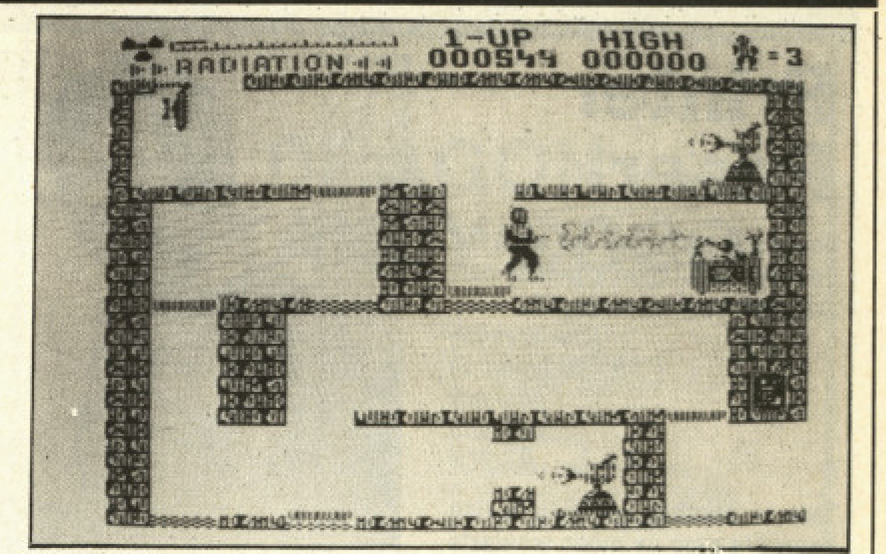
You play a fifth columnist in the game and your mission is to collect the four parts of a space ship, miniaturise them, and escape the base.

There are several defences designed to stop you, and all of them, as you can see from the screen picture, are depicted brilliantly (provided that you pick black to play the game in, the other colours are a hippie nightmare!).

These defences include laser guns, rotating lasers, forcefields (which must be deactivated by shooting their appropriate control consoles), Zadroids (indestructible killer satellites), and two-legged imperial walkers from 'Return of the Jedi' (don't ask!).

To aid you in your quest you have an incredibly powerful blaster which, unfortunately, is powered by the same system as your radiation shield, ie whilst the blaster is firing your radiation increases drastically.

You are also equipped with the ability to dissolve your particles making you invisible and also invulnerable to laser fire but to do this again makes you exposed to the deadly radiation . . . too much of this and you literally fry on screen.



The explosions are superb, the enemies are actually frightening, and the sound, from the four part playing of the *V* title music, to the Game Over tune is quite smooth and even pleasant!

But, not only does the game look great, it plays smoothly, quickly, and with just the right amount of sensitivity. The screens are designed very carefully, one involves shooting a sequence of force-fields out and the screen only slowly opens up as this is done. The game really does become progressively more difficult, towards the end lives disappear with horrifying speed!

This is a quite brilliant piece of work, the Juxta-Position of Arcade games this year, and if it's not a best seller then you're all stupid!!

Jason Orbaum



Printer Poser

Could you please tell me what the pins on the Dragon's printer port are, and how to access them.

Paul Meehan
5 Chattaway St
Neehalls
Birmingham
B7 5LN

This is another question which seems to crop up more regularly than others. The pin connections to the printer port are given in the additional information booklet or appendix. They are as follows:

Pin 1 = Strobe, Pins 3,5,7, 9,11,13,15,17 = Data bit 0-7, Pin 19=ACK, Pin 20=Busy, Pins 2,4=+5v, other pins=0 volts.

There respective I/O locations are $FF20 bit 1=strobe, $FF02=Data Output, $FF22 bit 0=Busy Input. ACK is an interrupt input, see DU March '85 for details.

Cyclic Crash

I have two very full disks which together comprise a single adventure game I have written for the Dragon 32 — a total programme of some 300 K. I operate on a single disk drive system, and have tried to take back-up copies. Unfortunately, I get a cyclic redundancy (CC) error on the destination disk. In calling up DIR, the destination disk does seem to have all the programmes on it, and even shows the same number of bytes free.

If I then try to run a programme from the destination disk, I get a wrong file mode (FM) error.

Are you able to tell me what on earth is going on — and in particular can you explain the cyclic redundancy error to me.

R F Sibthorpe
High Green
The Drive
Belmont
Surrey

The Dragondos manual is a little vague to say the least where error messages are concerned. A 'CC' error stands for 'Cyclic Redundancy' error — more commonly known as CRC. Basically, CRC's are a sophisticated version of checksums, which use polynomials to produce a unique number which is appended to the end of each sector written. When the data is read back from the sector, the CRC is recalculated and compared to that stored on the sector, if they are different then the data has been corrupted.

I'm afraid that this is what has happened to your disk, the corrupted data also causes the 'FM' error. The DIR command will still show files intact as the directory track has not been affected and DIR only looks at that.

If your files are mainly Basic, you may well be able to rescue most of them by using one of the Disk Doctor programs available, several of which have been reviewed in Dragon User.



Blinking Cursor

I have a Dragon 32 and the blinking cursor is driving me nuts! How can I make it still — and possibly even change its shape?

I M Macdonald
51 Tynwald Hill
Liverpool
L13 7DN

It is relatively simple to stop the cursor blinking, but rather more complicated to change the character used as the cursor, although it can be done.

The short machine code routine listed below can be used to provide a steady black cursor, once run the cursor will remain steady until the machine is turned off.

```
10 CLEAR 200,32750
20 FOR I = 32751 TO 32762:
   READ A:POKE I,A:NEXT
30 DATA 13,111,39,1,57,134,
   128,167,159,0,136,57
40 POKE 362,126:POKE 363,
   127:POKE 364,239
```

Video Video

I wish to connect my Dragon 32 to a 7 pin Din RGB socket on my television via the 5 pin Din monitor socket at the back of my Dragon. I will have to join them myself. Could you please show me which pins to connect between these two as I have no idea.

Colin J Gali
400 Cluny Place
Glenrothes
Fife
KY7 4RA

This is one of many letters regarding connection of RGB monitors to the Dragon, it has been answered before but due to the number of enquiries it is worth repeating.

The Dragons monitor socket has only three connections, pin 1 is sound, pin 2 is ground, and pin 3 is video. The video output is composite video and can only be used with composite video monitors, there is no way of connecting a Dragon to an RGB monitor either from the socket, or even direct from the video chip, as this only outputs composite video.

The confusion all stems from the original Dragon manual which stated that the monitor socket was RGB, which it has never has been.

32 plus 32 equals?

I would like to link two Dragon 32's together. Firstly to communicate between the two machines and secondly to use one as a printer buffer for the other. The obvious solution is to use an RS232 interface but the circuit I have is limited to 300 baud.

I think the data bus of each machine can be linked directly with the other but do not know if any buffering is necessary can you suggest how I can link the two together to effect a rapid exchange of data or where I can get more information about how to do this?

N F Welch
88 Chichester Drive
Chelmsford
Essex
CM1 5RY

Joining two Dragon 64's is simple, via the RS232 sockets, but joining two 32's is more difficult. You cannot directly connect the data buses of the two micros from the cartridge port — to do so would probably mean the end of both micros!

Your best bet is probably to purchase, or build, two I/O ports to plug into the cartridge ports and then link the Dragons via a length of ribbon cable. These ports are available from about £40 each.

Problem String

The following line keeps giving me an FC ERROR message when the whole program is run:

1300 IF MID$(T$(K),K9,1) ""THEN K9=K9+1: GOTO 1290

I just can't seem to work out what the error is. Could you help me please?

Steven Dinnen
24 Charleville Ave
Lisburn Road
Belfast
BT9 7HG

The MID$ command can be used to return any section of a string variable, even a non-existant section (it will return a null string). The only time MID$ will complain is if the start position — given by the variable K9 in your program — is greater than 255 or less than 1. The error is probably caused by K9 reaching 256 as there seems to be no test on its value.

The Dragon manual also omits to point out that the MID$ command can be used on the left of an expression to change sections of a string, as in:

MID$ (A$,5,3)="123"

This can often be very useful indeed, saving much concatenation of strings.



I'D LIKE to begin this month by apologising to the people who I don't get round to mentioning in the column, despite my having written to them promising to try to squeeze their letter in if there's space. The simple reason is that there's never enough space. This month, for example, I've received two adventures only recently on the market, another adventure written by a reader, the latest bulletin from The Adventurers Club Ltd, the usual few dozen brief letters and the usual dozen or so lengthier epistles containing clues by the score for sharing with other readers. And I've already wasted a paragraph explaining about the lack of space!

First, then, another quick mention for The Adventurers Club, whose latest dossier will be of interest as it carries a lengthy review of, and a complete solution to, *Black Sanctum*. That's in addition to the rest of the reviews, hints, letters and so on that pack its 24 pages. With 10 per cent of its membership being Dragon owners, it's worth checking out if your monthly fix with *Dragon User* isn't enough. Phone 01-794 1261 for details.

Beginners

Geoff Smith of Cheshire writes to agree with the reader who recently asked for more tips for beginners, and I suppose it's true that I do tend to forget that there are new people reading the column each month, not familiar with older games or unable to understand how some of the solutions work. Geoff was also a little puzzled as to why the clues I give are written backwards — well, it's not so that you can type them in backwards if they don't work the right way round, it's just to prevent someone else who's playing the same adventure from accidentally seeing it in case they don't want to.

A Mr P Nugent of Irlam, Manchester, asks me "in general, is there a way through the various mazes in adventure games or is the object just to get out of the maze again?" Let's look on that question as this month's advice for beginners, then. There's no one hard and fast rule about mazes, they're just one of the frequent features of adventure games, and can be there for different reasons. The majority are probably there just to fox you and see if you can find your way out again, and with most you'd find that you'd probably come out where you went in, but being extra careful which way you go in future. Some will have another exit which you must locate in order to reach a new area of the game, and some will contain an object (or objects) which you have to find before you get out again. Others will contain creatures or traps that are better avoided.

Amazing

A good maze can be enjoyable simply because you don't quite know what to expect each time, as with the adventure itself. It's one of the problems you have to work out, with a common way of mapping a maze being by the use of the objects you're carrying. "You are lost in the forest" will be a typical maze description. No matter which direction you type in, you probably get the same description again. Sometimes this means you've moved to a different location which has an identical description, and sometimes you've simply been taken back to the same location. You could try going North for eighteen moves, and still be in the same place, which is about as much use as trying to get anywhere on an exercise bike. But if you drop an object in a location, you can check whether you're actually moving elsewhere or staying put, in which case the object will still be there. In many mazes you find that three of the exits actually return you to the same place, with the fourth taking you somewhere else, and then that's repeated again and again.

A seemingly enormous maze can be made up of just four or five apparently identical locations, but you can slowly map these out provided you are carrying at least two or three objects, and also save your position as soon as you know you are in a maze, just in case you do get completely lost (and that happens to us all.) Some programmers will be one step ahead of you and move objects round if you try to drop them, or they'll have a thief come in and steal them, or perhaps cover the floor with mist or swamp so that anything you drop immediately disappears. I must admit that I don't like this kind of thing as you have to find your way out by persistence and luck. A good maze should always have a way of solving it, no matter how devious or lengthy the process.

This brings me to *Castle Blackstar,* a Dragon adventure I'd never heard of, till a reader wrote in to say that they had solved it. Not many other people have mentioned it at all, which is a pity because it's an excelent adventure, as I can see now that the publishers have sent me a copy. This has a forest maze right at the start of the game, and if you wander in there with no objects you are immediately lost. Better to set off in another direction and arm yourself with a few things first, and then if you go down to the woods that way you'll be sure of a few surprises.

This text-only game revolves around you having to find a magic orb and return it to a princess, though to score the 250 points that are going begging you must also overcome all the problems and cleanse all the treasures of their evil, which will take more than a quick dip in Persil, I bet. The text is very lengthy and atmospheric, and the game incorporates some very nice features. As well as being able to save to tape, you can use the FREEZE command to save your position to memory and call it back at any point with UNFREEZE. There's also a VERBOSE command, giving you full descriptions for each location on each visit, or QUIET which only gives you the full version first time round, to speed up moving about. The vocabulary, too, is extensive, and in order to enter a building I was able to use ENTER, ENTER BUILDING, ENTE or just IN.



The early locations are in and around the caste of the title, though you should soon discover at least one way into a network of underground passages, provided you've discovered our old friend the lamp, and our even older friend the oil to put in the lamp. I wish there were more space to give you some idea of the large scale of this adventure, too, but all I can do is recommend you buy it at £5.00 on tape or £6.50 on disk (Dragon Data drive) from SCR Adventures, 5 Christchurch Road, Surbiton, Surrey KT5 8JJ.

I was slightly less impressed by *Sam Buick*, from Stratosoft, 2 Main Street, Frodsham, Cheshire at £6.75. It begins well enough, with a beautifully impressionistic loading screen of the Statue of Liberty against a New York skyline, this then being replaced by a cartoon strip style shot of our hero, Sam Buick, the New York private eye. After a little mood music and some optional instructions, you're into the game itself, and both this month's titles have sensibly redesigned the character set for ease of reading and a better screen lay-out.

Mystery

As Sam Buick you start the game in your office, filled with the smell of stale coffee, and a murder mystery to unravel on behalf of the type of blonde who always seems to walk into the office of private eyes everywhere. You wander out into the streets of New York (or Noo Yoik, to borrow the game's Brooklyn vocabulary). The weather's a bit inconsistent, raining in one location and too warm in the next, and the vocabulary's not half as comprehensive as *Castle Blackstar*. At one point I went into the apartment of my informer, Dabs Malone, to see what info he could give me on the crime, and Dabs told me "Pay out 10 bucks first, okay?" What would you reply to that? I tried OKAY, YES, AGREE, PAY TEN BUCKS, OFFER MONEY, GIVE MONEY, GIVE TEN BUCKS, SAY YES, SAY OKAY, in fact everything I could think of but all to no avail.

I didn't care, as I never do, for the lack of a SAVE facility, or for the instructions (which include some unusual commands) not being printed on the cassette inlay, or the fact that you can only make a certain number of moves before you die of starvation. I've found one restaurant, the entrance to which only seems to appear once you've gone past it and returned, but it's frustrating to find that you need to eat when you're wandering off checking out new locations, and so instead you have to start thinking about finding some other source of food. Fail to do it and you have to start the game afresh, which is annoying, though the game does have plenty of humorous touches to it and perhaps I'd like it more if there weren't so may other good adventures around at the moment.

Such as *Juxtaposition*, of course, which John Baker of Bridgend has already completed. He offers a few clues, such as "brown before green" and "blue before yellow," and I think I'll be revealing some more clues for this title next month.

Thanks to reader W. G. Jones for pointing out that you can still buy *Madness and the Minotaur* (which lots of people had asked me about) from Maplin Electronic Supplies Ltd, PO Box 3, Rayleigh, Essex SS6 8LR for £5.95 including p & p. Finally, if anyone wants an adventure-mad Israeli pen-pal write to Sharon Seavery, Habrushim 21/1 Strett, Carmiel 20100, Israel.

All this space and I'm still left with a pile of very helpful reader's letters, all untouched. Maybe next time — famous last words!

Adventure Contact

To help puzzled adventurers further, we are instituting an Adventure Helpline — simply fill in the coupon below, stating the name of the adventure, your problem and your name and address, and send it to Dragon User Adventure Helpline, 12/13 Little Newport Street, London WC2H 7PP. As soon as enough entries have arrived, we will start printing them in the magazine.

Don't worry — you'll still have Adventure Trail to write to as well!

Adventure ....
Problem..............................
....
Name ....
Address..............................
.... **Feb 86**

Adventure Contact

Adventure: Franklin's Tomb. **Problem:** Don't know how to stop the water at Aquarium after pressing button. **Name:** William Tilbury. **Address:** The Cedars, Harby Lane, Melton Mowbray, Leicestershire.

Adventure: Sea Quest and Shenanigans. **Problem:** Everything. **Name:** Michael Pointing. **Address:** 82 Raymend Road, Bedminster, Bristol, B53 4QW.

Adventure: Castle Adventure. **Problem:** How do I enter the dark room? How do I open the small box? With what do I break the glass over the North exit? **Name:** Chris Bill. **Address:** Basement Flat, 69 Dorchester Road, Weymouth, Dorset, DT4 7JY.

Adventure: Castle Adventure. **Problem:** Cannot get out of the Walled Garden, also cannot get trapdoor to open in chapel. **Name:** Mark Coops. **Address:** 16 Willows Drive, Meir Heath, Stoke-on-Trent, ST3 7LZ.

Adventure: Black Sanctum. **Problem:** How am I supposed to make the altar to exorcise the evil in the Abbey? **Name:** Simon Foster. **Address:** 14 Grizedale Place, Heysham, Lancs.

Adventure: Shenanigans. **Problem:** What to do at postboxes at Underground stations and how to read the sign. **Name:** Daniel Edwards. **Address:** 8 Cox Crescent, Dunchurch, Rugby, Warwickshire, CV22 6QX.

Adventure: Black Sanctum. **Problem:** I can't complete the adventure without my lantern running out. **Name:** Anon. **Address:** The Ceders, Harby Lane, Hose, Melton Mowbray, Leicestershire.

Adventure: Keys of the Wizard. **Problem:** I can't find the sanctuary to put my treasure in. **Name:** Peter Keefe. **Address.** 7 Rochester Avenue, Feltham, Middlesex, TW13 4EA.

Adventure: Syzygy. **Problem:** What is the right transporter co-ordinates to get to the emerald? **Name:** Lasse Lonnberg. **Address.** Tallmograno 443, 10300 Karlaa, Finland.

Adventure: El Diablero. **Problem:** I can't open the box. **Name:** S. L. Taylor. **Address:** 14 Pembroke Gardens, Wellbourne, Warwickshire.

Adventure: Sea Quest. **Problem:** I have a gold anchor and a credit card for Michael Nelson Jr — what do I do now? **Name:** E. A. Freestone, 61 Maplehurst Road, Summersdale, Chichester, West Sussex, PO19 4RP.

Adventure: Ket Trilogy. **Problem:** I can't get past the giant Zombie. Can you send me the hint sheet? **Name:** Michael Emsley. **Address:** 3 Ladywell Road, Kintore, Aberdeenshire, AB5 0UG.

Adventure: Pettigrews Diary. **Problem:** Cannot avoid burning. No progress despite receiving help. **Name:** G. R. Guthrie. **Address:** 83 Woolbrook Road, Sidmouth, Devon, EX10 9XD.

Adventure: Caverns of Doom. **Problem:** What do you do after swimming and end up in the large cavern? What do you do when flash goes out? **Name:** Jeremy Barson. **Address:** 11 Silver Birch Avenue, Culverstone, Meopham, Kent, DA13 0TP.

Adventure: Return of the Ring. **Problem:** How do I get the chest open in Halm's Temple? Where is Merak the Elf? Can't find him. **Name:** Darren Biggs. **Address:** 39 Doxford Place, Cramlington, Northumberland, NE23 6DU.

Adventure: Return of the Ring. **Problem:** How to get the red pass and what use is the yellow pass? **Name:** Darren Biggs. **Address:** 39 Doxford Place, Cramlington, Northumberland, NE23 6DU.

Classified

DRAGON 32K plus games, £50 and Dragon 64K, £80. Telephone after 5pm: 01-986 2658.

DRAGON 64, six games, DRS, graphics, home accts, joystick, Cosmos 80 Printer (wordproc), leads, manuals, £250 ono. 0273 832162.

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REPAIRS. For a free estimate send your Dragon to: M.D. Electronics, The Laurels, Wendling, Dereham, Norfolk. Tel: 0362 87327.

DRAGON 32, plus Dragon disk drive, cassette recorder, two joysticks, cartridges, over 40 tapes and 17 disks (Spreadsheet, Telewriter, Filmastr, Business Accounts, Home Accounts, games galore), plus magazines and books, £300. Tel: (0844) 208888 (Bucks).

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FREE MEMBERSHIP software library. recent titles, cheapest prices or exchange unwanted software, S.A.E. details, M.R.V., 120 Auriel Avenue, Dagenham, Essex.

DRAGON 32, tape recorder, 20 games, joysticks. £80. Harlow 35046.

DRAGON 32, joysticks, cassette recorder, £400. Games and other software, £150 ono. Telephone (04203) 7830.

DRAGON 32, repair or exchange board as neccessary, £27 + VAT, includes return postage. Send to Computer Care Centre, Artillery House, Gunco Lane, Macclesfield. Tel. 0625 614967.

Here's my classified ad.

(Please write your copy in capital letters on the lines below.)

£0.20	£0.40	£0.60	£0.80
£1.00	£1.20	£1.40	£1.60
£1.80	£2.00	£2.20	£2.40
£2.60	£2.80	£3.00	£3.20
£3.40	£3.60	£3.80	£4.00
£4.20	£4.40	Please continue on a separate sheet of paper	

Name...

Address...

.... **Telephone**.............

Please cut out and send this form to: Classified Department, *Dragon User*, 12-13 Little Newport Street, London WC2H 7PP

Firmware

Brian Cadge explores the Dragon's ROM in a special series which builds up month by month into a firmware manual.

This month we look at the various firmware 'vectors' used for Reset, Interrupts and Expansion.

Reset Vector

The hardware is configured so that a reset always jumps to the ROM. The ROM routine first of all checks location 113, if this is not set to 85 decimal then a full Cold Start is performed. Next the address of the restart routine is fetched from locations 114/115, and as a double check for power up, the reset routine checks that the first instruction of the restart routine is a NOP. If it is not then a Cold Start is performed. The standard restart routine resets the text screen and clears it, stops the cassette and disk, resets the stack and enters the Command mode.

Interrupt Vectors

The standard IRQ interrupt is caused by the 'Field Sync' of the TV, and occurs 50 times a second. This is used to update the TIMER location (274/275) and to decrement the general purpose count down facility (141/142). With Dragondos attached, the IRQ is also used to control the disk motor off delay.

The FIRQ interrupt is caused by one of the two inputs — either a cartridge is present, or an ACK signal has been received from the Printer. The Standard FIRQ ROM routine checks that the interrupt was caused by a cartridge by looking at the Cartridge flag (bit 7 or $FF23) and returns if it was not. If a cartridge is present then after a delay a cold start is performed to the cartridge. With Dragondos attached the ROM routine simply clears the interrupts by accessing locations $FF21 and $FF23 and then returns.

The NMI is not normally used, and does not have a ROM routine. It is used by the Dragondos cartridge and a ROM routine is set up to deal with it — the NMI vector should not be changed with Dragondos as it will then be impossible to access the disks correctly.

The 6809 CPU allows for three software interrupt routines, the Basic ROM does not use any of these and does not have any routines to deal with them — they are available to the user. The CPU vectors are mapped from the ROM into locations $FFF2 to $FFFF and are not alterable. These point to Extended page RAM locations which can be patched by users. The first byte should always be a JMP instruction, followed by the address of the routine.

The RAM vectors for interrupts are as follows:

256–258	SW13Jump Vector
259–261	SW12Jump Vector
262–264	SW1 Jump Vector
265–267	NMI Jump Vector
268–270	IRQ Jump Vector
271–273	FIRQ Jump Vector

Expansion Vectors

There are 25 expansion vectors. These are three bytes each and normally contain RTS instructions. They can be patched with a JMP instruction to expand the system — they are used by Dragondos for example just before a character is output — this could be patched to provide a customized screen driver.

Note that Device numbers are allocated as follows, and that the current device is stored in DEVN — location 111.

0=VDU,

−1=CASSETTE,

−2=PRINTER

350 Device Open
Called immediately before an OPEN command is executed.

353 Device Number
Called whenever a Device Number is verified, it can be patched so that normally out of range numbers can be used — eg for disk files.

356 Device Initialization
Called immediately before setting up the current device parameters in locations 106 to 109.

359 Output Character to DEVN
Called immediately before outputing the character in the A register to DEVN.

362 Input Character from DEVN
Called immediately before inputting a character from device DEVN into the A register.

365 Input File
Called before inputting from a file using INPUT.

368 Output File
Called before outputting to a file using PRINT.

371 Close All Files
Called before all files are closed — actually action is only taken if the cassette is open.

374 Close File
Called before a device is closed by the CLOSE command — action is only taken if the device number in DEVN is −1.

377 Command Interpreter
Called before interpreting the token in the A register as a command. This is used by Delta Dos for adding new commands to Basic.

380 Re-Request Input
Called before re-requesting more data from the Keyboard, ie just before the '??' prompt.

383 Check Keys
Called before the keyboard is scanned for Break and Shift @. The keyboard is not scanned if the DEVN is −1. This vector can be patched to disable BREAK.

386 Line Input File
Called before a LINE INPUT command is executed on the current DEVN.

389 Close File and Command
Called before closing an ASCII file just read in as a Basic program by CLOAD and returning to Command Mode.

392 Check EOF
Called before checking for EOF for the current DEVN.

395 Evaluate Expression
Called before evaluating an expression

398 User Error Trap
Can be patched by the 'user' (ie a Basic Program) to trap error messages.

401 System Error Trap
Can be patched by the 'system' (ie Basic extension ROMs) to trap or extend error handling, this is used by Dragondos.

404 RUN Link
Called when a RUN command is about to be executed. Patched by Dragondos to allow a disk filename to be specified after the RUN command.

407 Reset Basic Memory
Called from two routines in the ROM — before the Basic Memory Vectors are changed, by entering or editing lines, or loading programs etc.

410 Get Next Command
Called before reading in the next Basic command to be executed during runtime.

413 Assign String Var
Called before assigning a string to a string variable.

416 Screen Access
Called before the CLS, GET and PUT commands are executed.

419 Tokenize Line
Called before an ASCII line is tokenized to internal Basic format.

422 Detokenize Line
Called before a tokenized line is converted to ASCII characters.

Next Month: Miscellaneous Firmware Functions & Routines.

This is the sixth in Brian's series on the Dragon's Rom routines. Next month he will be covering Firmware Vectors.
If you have missed any of the previous issues, they can be obtained from Dragon User, Back Issues, 12-13 Little Newport Street, London WC2H 7PP, at £1.25 each, inclusive of postage, packing and administration charges.

Just to remind you of previous months:
Sept 85 — Cassette Operating System
Oct 85 — COS Firmware Routines
Nov 85 — Text Manager Routines
Dec 85 — Graphics and Sound
Jan 86 — Variables

Answers to Competition Corner, *Dragon User*, 12-13 Little Newport Street, London WC2H 7PP.

Seeing stars

THE RECENT proximity of Halley's comet has led to a greater than usual interest in matters astronomical, although now that it is heading back into the depths of space, comet watchers will have to wait until the year 2062 AD — the date of its next predicted return.

Professional astronomy is a field of study which is now heavily dependent on computers, and there is little reason why any amateur astronomers, who are also adept at programming, should not use their computers as a valuable aid. A quick glance through the pages of any astronomical almanac will reveal columns of figures denoting the R.A. (right ascension) and declination used for locating the various stars and planets on given dates, and anyone with understanding of celestial mechanics could, no doubt, produce a program to display a star map for any date, time, and location. This would be a twentieth century version of the orrery — those mechanical models used by early astronomers to show the movement of certain planets round the sun.

On a less complex level, readers might be interested in writing their own program based on the following calculations which determine the moon's age (phase) on any given date. The moon has a diameter of 2160 miles and orbits the earth at a mean distance of 238,857 miles. It rotates on its own axis every 27.32 days, which is also the time that it takes to orbit the earth. It is for this reason that we can only see one side of the moon, and the period 27.32 days is known as a *sidereal* month. However, the *phases* of the moon are related to its *synodic* month, that is, the period between one new moon and the next. This is a period slightly in excess of 29½ days.

The calculation which follows is taken from a very old book on astronomy, and although the theory behind it is rather obscure, it does give surprisingly accurate results. In order to demonstrate its use, the calculation for finding the phase of the moon on St. Valentine's day (14th February 1986) is given in Table One.

This final remainder tells us that on the given date the moon will be just three days after new moon. Note that a *full* moon will be at age 14/15 days, and a new moon at 0/29 days.

Adapting the above method into a computer program should not be too difficult, and as a check for accuracy (in the programming) try the following dates:

Group 'A' — April 9th 1986, October 3rd 1986, March 29th 1987, September 23rd 1987, and March 18th 1988.

Group 'B' — April 24th 1986, October 17th 1986, October 7th 1987, August 27th 1988, and February 20th 1989.

All those dates in group 'A' are days on which there will be an eclipse of the sun, and those in group 'B', an eclipse of the moon. As an eclipse of the sun can only occur when the moon is new, and an eclipse of the moon can only occur when it is *full*, these dates can be used as a useful check of the program.

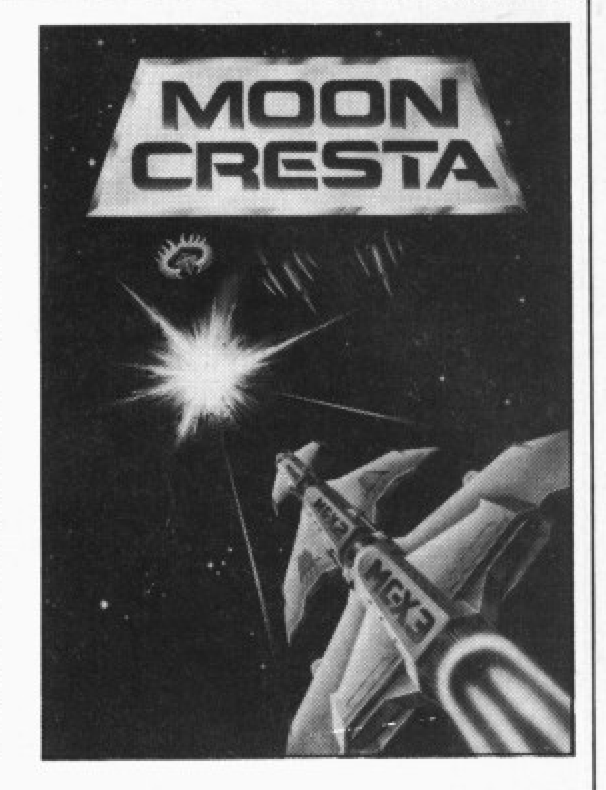


Table One

Divide the year by 19 and note the remainder.	1986/19 = 104 r.10
Multiply this remainder by 11.	10 * 11 = 110
Divide by 30, and again take the remainder.	110/30 = 3 r.20
Add the number of centuries in the year divide by 3 (ignoring remainder).	20 + 6 = 26
Add the number of centuries in the year divided by 4 (ignoring remainder).	26 + 4 = 30
Add 6.	30 + 6 = 36
Subtract number of centuries in year.	36 − 19 = 17
Add month (Jan = 1, Dec = 12).	17 + 2 = 19
Add date.	19 + 14 = 33
Finally, divide by 30 and take remainder	33/30 = 1 r.3

Competition

As it is almost St. Valentine's Day, perhaps I might be allowed the following message to my wife:

```
 G O R D O N
   L O V E S
 -----------
 D E N I S E
```

It seems a pity to spoil the romance of the moment, but the message as shown forms an alphamatic sum. The sum is a simple addition, not quite so simple however, is substituting digits for letters — a different letter denoting a different digit, the same letter denoting the same digit wherever it occurs. If this is done correctly it will work out exactly.

Can you find the solution? (Note that in puzzles of this type you are *not* allowed to put a zero as a leading digit e.g. in this case as 'D', 'L', or 'G').

Prize

This month, we are offering 25 prizes courtesy of Incentive Software — in fact they are offering you the choice of any one of their pre-Moon Cresta Dragon releases.

Rules

To win an Incentive game, you must first show the answer to the above competition, and demonstrate how you solved it with the use of a Basic program written on your Dragon. Please do not send in a cassette containing your program. Make sure your name and address are clearly printed on your entry and mark the envelope "February Competition". Envelopes which do not state which month you are entering for will be disqualified.

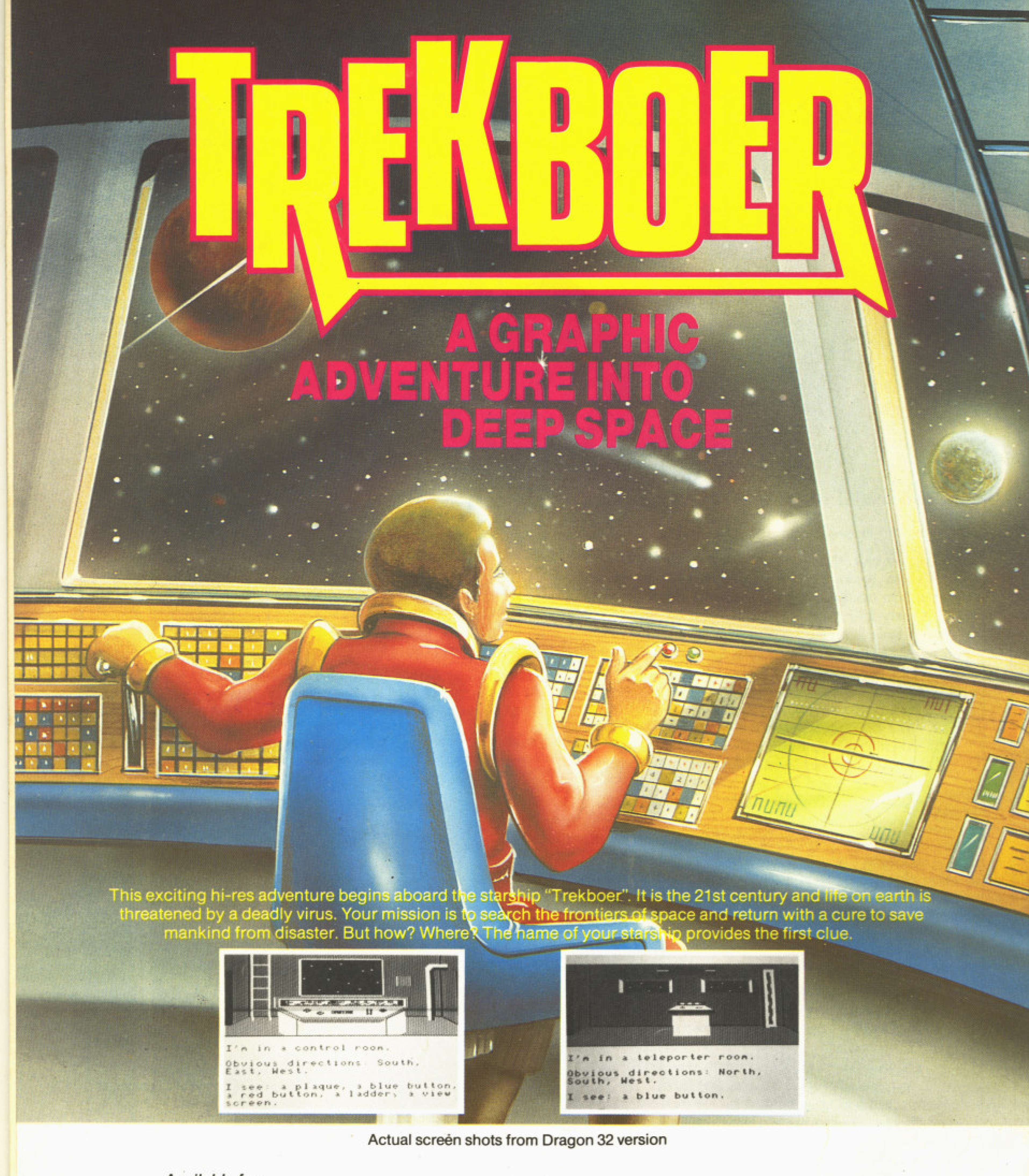
As a tie breaker for this month, Ian Andrew of Incentive has set you a further task. How many dedicated space arcade game machines can you name? The 25 correct answers that can name the most will win a prize . . . and don't forget to nominate which game you would like to have.

November Winners

The twenty winners of the November competition have won themselves copies of Dark Star by Design Design. Congratulations go to the following:

M Spencer of 21 Wheelock Drive, Winsford, Cheshire, C L Naylar of Cardigan, Simon Aubrey of Swindon, Terry Potter of Chiseldon, M Owens of Tonteg, M Ingham of Leeds, Cayuela Simon of Blois, France, M W Stonton of Towcester, R F Wilton of Swanley, P L Bates of St Albans, R H E Bootman of Oakley, Andy Grubb of Royton, Oldham, A J Parsons of Whiston, Paul Priestland of Lechlade, R Crowther of Rotherham, R J Telkman of Sale, P Fairbain of Kilmaurs, Charles Daly of Windsor Hill, Co. Cork, M Heaps of Washingborough, C R Dean of Enfield.


What's your best source of information on color computing?
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Now you can improve your color computing skills... and it's easy to do. HOT CoCo gives you more practical information on the Dragon* than any other publication. Nearly 150 pages a month!
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•The Basic Beat—learn everything you need to program in Basic
•The Educated Guest—discover how to use your computer as a teaching tool
•Doctor ASCII—get answers to your technical questions
•Graphically Speaking—create eye-catching designs that add appeal to your programs
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